These documents are Federal emergency consultations for EM-3591-CA in preparation for DR-4683-CA. To assist the subapplicants, FEMA-EHP is requesting the counties, and potential subapplicants found within those counties, currently declared under DR-4683-CA, be provided the attached emergency consultation letters and the applicable Programmatic Agreements as referenced in the letters. In the case of the subapplicants located within the jurisdiction of the Ventura Fish and Wildlife Service please reference the Appendix B Word file as well. These documents are broken down by jurisdictions and the corresponding PA-eligible counties below, although additional counties may be added.

Arcata Fish and Wildlife Service Jurisdiction (USFWS and NMFS letters, Arcata & Yreka USFWS PBO, NMFS PBO):
Humboldt County
Siskiyou County (Portions of)
Trinity County (Portions of)
Mendocino County
Tehama County (Portions of)
Glenn County (Portions of)
Colusa County (Portions of)
Lake County (Portions of)

Yreka Fish and Wildlife Service Jurisdiction (USFWS and NMFS letters, Arcata & Yreka USFWS PBO, NMFS PBO):
Siskiyou County (Portions of)
Trinity County (Portions of)

Sacramento Fish and Wildlife Service Jurisdiction (USFWS and NMFS letters, Sacramento USFWS PBO, NMFS PBO):
Butte County
Glenn County
Colusa County
Yolo County
Placer County
Sacramento County
Calaveras County
San Joaquin County
Sonoma County
Alameda County
Santa Clara County
Merced County
San Mateo County
Fresno County
Tulare County

Ventura Fish and Wildlife Service Jurisdiction (USFWS and NMFS letters, Ventura USFWS PBO, NMFS PBO, Appendix B from Ventura FWS):
Santa Cruz County
San Benito County
Monterey County
San Luis Obispo County
Santa Barbara County
Ventura County
Los Angeles County (Portions of)

Carlsbad Fish and Wildlife Service Jurisdiction (USFWS and NMFS letters, Carlsbad USFWS PBO, NMFS PBO):
Los Angeles County (Portions of)

NIMFS Emergency Consultation Letter

2022/2023 Statewide Winter Storms

DR-4683

The following letter provides guidance from NIMFS for work performed in response to the 2022/2023 Statewide Winter Storms beginning January 8, 2023.

The letter includes a table with ESA-listed species and designated critical habitats in affected counties in California under the jurisdiction of NMFS.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

January 30, 2023 **Refer to NMFS No:** INQ-2023-00018

Kenneth Sessa
Acting Environmental Officer, FEMA Region 9
Federal Emergency Management Agency
U.S. Department of Homeland Security
1111 Broadway, Suite 1200
Oakland, California 94607-4052

Re: Emergency Endangered Species Act (ESA) Section 7 Consultation and Magnuson-Stevens Fishery and Management Act Consultation Response for California Severe Winter Storms, Flooding, and Mudslides (Emergency Declaration FEMA-3591-EM-CA)

Dear Mr. Sessa;

On January 13, 2023, NOAA's National Marine Fisheries Service (NMFS) received the Federal Emergency Management Agency's (FEMA) request to initiate emergency consultation under Section 7 of the Endangered Species Act (ESA) (16 U.S.C. 1531 *eq. seq*.) for work performed in response to Emergency Declaration FEMA-3591-EM-CA for severe winter storms, flooding, and mudslides that occurred in California beginning on January 8, 2023. Emergency actions anticipated by FEMA include, but are not limited to, actions to avoid or minimize imminent loss of life or property, life-saving storm response operations, community needs for survivor assistance, local/Tribal government assistance, mutual aid, emergency protective measures, debris clearance, and identifying recovery needs and long-term assistance programs.

FEMA's January 13, 2023, letter indicates proposed actions include reimbursement of applicants (grantees and/or subrecipients) for eligible costs in affected counties in California for emergency work performed in response to Emergency Declaration EM-3591-CA. Your letter also indicates that FEMA will have Environmental Specialists in the field supporting the Preliminary Damages Assessment teams and they will have an opportunity to inform potential grantees and subrecipients of best management practices, avoidance and minimization measures (AMMs), or NMFS' recommendations to minimize the effects of emergency response operations on listed species and designated critical habitat.

Enclosed is a table with ESA-listed species and designated critical habitat in affected counties in California under the jurisdiction of NMFS (Table 1). Additionally, there are areas within the affected counties in California identified as Essential Fish Habitat (EFH) for various federally-managed fish species pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1855(b)) (Table 2). For more information on listed species, designated critical habitat, and EFH in affected counties in California, please refer to the NOAA Fisheries Protected Resources Application and the NOAA Fisheries Essential Fish Habitat Mapper.

Many of the emergency actions identified in FEMA's January 13, 2023, letter for Emergency Declaration FEMA-3591-EM-CA are addressed in the September 25, 2018, NMFS' Programmatic Biological Opinion and EFH Response for FEMA's Disaster, Mitigation, and Preparedness Programs (PBO). The September 25, 2018, PBO is intended to cover many of the typical recurring disaster response actions funded by FEMA that adversely affect listed species and designated critical habitat in California, and allow for FEMA to effectively and promptly respond to disasters. NMFS recommends FEMA use the AMMs in Section 1.3.9 of the September 25, 2018, PBO for this emergency declaration. Section 1.3.9 includes 31 AMMs ranging from measures to minimize the effects of construction activities to design standards for bank stabilization projects. FEMA's Environmental Specialists in the field should encourage potential grantees and subrecipients to incorporate appropriate measures and design elements into their projects.

For emergency response actions that meet the PBO's suitability criteria, we recommend FEMA follow the process for ESA and MSA Compliance (Section 1.3.6) and the Monitoring and Reporting Requirements (Section 1.3.10) detailed in the September 25, 2018, PBO. The following are key measures for the protection of listed species, designated critical habitat, and EFH from the September 25, 2018, PBO that are likely to apply to Emergency Declaration FEMA-3591-EM-CA:

1. For projects that have the potential to cause erosion and introduce sedimentation into waters, wetlands, and riparian areas supporting listed species, the applicant would prepare an Erosion Control Plan. The Erosion Control Plan would detail the erosion and sedimentation prevention measures required (AMM-1: Erosion and Sedimentation Prevention Measures).
2. If bank stabilization activities, such as the placement of rock slope protection, are necessary, then such stabilization would contain bioengineering or design elements suitable for supporting riparian vegetation, and would be constructed to minimize erosion downstream potential. The use of gabions for streambank stabilization is prohibited. In areas that support juvenile salmonid rearing, bank stabilization projects would incorporate habitat enhancement features such as wood, boulders, and vegetation for habitat complexity to the extent feasible (AMM-2: Bank Stabilization).
3. The applicant would, to the maximum extent practicable, reduce the amount of disturbance at a site to the absolute minimum necessary to accomplish the project (AMM-13: Work Area Designation to Minimize Disturbance).
4. When working on stream banks or floodplains, disturbance to existing grades and vegetation would be limited to the actual site of the project and necessary access routes. Placement of all roads, staging areas, and other facilities would avoid and limit disturbance to stream bank or stream channel habitat as much as possible (AMM-14: Access Routes and Staging Areas).
5. All new or replacement bridges and culverts on anadromous-fish-bearing streams would be designed in accordance with the most current NMFS fish passage guidelines. All new stream crossings in EFH or habitat for covered anadromous fish must be able to allow passage of adult and juvenile life stages of the species (AMM-21: Bridge and Culvert Design).

6. Contractors would exercise every reasonable precaution to protect listed species, their critical habitat, and EFH from construction byproducts and pollutants, such as construction chemicals, fresh cement, saw-water, or other deleterious materials in accordance with federal, state, and local permitting (AMM-22: Water Quality Protection).
7. For projects that require revegetation of stream and river banks as a result of woody riparian vegetation removal during construction activities FEMA would require the applicant to prepare and implement a revegetation plan that includes information regarding monitoring for success. Revegetation plantings would be replaced at a 3:1 ratio with an 80% planting survival within 5 years of the plantings (AMM-24: Revegetation of Stream Banks).
8. In tidally influenced estuarine and marine areas that are designated as EFH and/or may support listed species, disturbance to habitat below mean higher high water would be limited to the maximum extent possible (AMM-26: Work below Mean Higher High Water).
9. If pumping is necessary for channel diversion, the pump intakes would be provisioned with NMFS-approved fish screening as outlined in California Department of Fish and Wildlife Fish Screening Criteria and NMFS Fish Screening Criteria for Anadromous Salmonids (AMM-29: Fish Screening Criteria).
10. For emergency actions that require in-water work in areas supporting black abalone, pre-construction surveys for the species would be conducted if there is potential for the construction to result in injury or mortality of the species. The survey would be conducted by a qualified Biologist who has experience in visually identifying black abalone in the field and characterizing habitat parameters important for black abalone persistence no more than 30 days preceding the onset of in-water construction. The results of the preconstruction survey would be documented in a report prepared by the Biologist and submitted to NMFS for approval, and Cal OES would be copied on the submittal.

    Black abalone encountered during pre-construction surveys would be reported to NMFS. If NMFS so directs, isolated black abalone (>2 meters [6.6 feet] apart from another black abalone) encountered during the pre-construction survey would be relocated to a pre-determined, NMFS-selected intertidal area containing suitable habitat. The relocation area would be as close as possible to the collection site to minimize handling time. Black abalone relocation would be performed by a qualified Biologist and would adhere to the handling protocol described for black abalone in the Protocols for Black Abalone Collection, Transport, and Holding (NMFS 2021). Should a group (two or more black abalone within 2 meters [6.6 feet] of one another) of black abalone be encountered within 12.2 meters (40 feet) of the project footprint, repositioning the project footprint to avoid black abalone would be considered. If repositioning the project footprint is not feasible and if NMFS so directs, groups of black abalone may be relocated to a pre-determined, NMFS-selected intertidal area following the handling protocol described for white abalone (AMM-18: Pre-construction Surveys and Relocation of Black Abalone).

    In addition to AMM-18 from the PBO, we recommend the following measures for black abalone:

- Conduct preconstruction surveys using the methods and best practices identified in NMFS' Abalone Survey Guidelines (2021).
- Implement measures to prevent and minimize introduction of materials (e.g., sediment, debris) into the marine environment during construction operations, to avoid negative effects on black abalone, kelp, and suitable habitat (rocky intertidal and shallow subtidal habitat).
- Implement measures to minimize turbidity (e.g., turbidity curtains) to minimize possible negative effects to surrounding kelp, black abalone, and suitable habitat.
- Only NMFS-approved, experienced biologists may conduct black abalone collection, handling, and relocation activities.
- If black abalone are encountered during pre-construction surveys, coordinate with the NMFS WCR Long Beach office (black abalone recovery coordinator) to determine whether to relocate the abalone to suitable rocky intertidal habitat or bring the abalone into captivity. Additional monitoring and reporting requirements will be determined in coordination with NMFS WCR.

The September 25, 2018, PBO does not address ESA-listed species of marine mammals and sea turtles. For listed marine mammals and sea turtles we recommend the following measures:

1. Monitor area at least 100 meters surrounding project areas where ESA-listed marine mammals and sea turtles may be present. If any ESA-listed marine mammals or sea turtles are spotted within this area, activities should cease as soon as safely possible to avoid or minimize the risk of direct contact with project activities and impacts, when feasible. Activities should not proceed until the animals have been observed to leave the area or until at least 15 minutes have passed since their last sighting.
2. If any activities involve the generation of high levels of in-water sound (e.g., pile-driving), monitoring and shut-down procedures may need to be across a larger area commensurate with thresholds for avoiding harassment or injury for any marine mammals under the Marine Mammal Protection Act. Level B harassment may occur when exposed to underwater noise above root-mean-square (RMS) received levels of 120 dB re 1 μPa for continuous (e.g., vibratory pile driving, drilling) and 160 dB re 1 μPa for non-explosive, impulsive (e.g., impact pile driving) or intermittent (e.g., scientific, non-tactical sonar) sources. For additional guidance, please refer to the NOAA Fisheries Marine Mammal Acoustic Technical Guidance.
3. If any ESA-listed marine mammals or sea turtles are observed in the vicinity of project activities, information about the species, number, and behavior of animals observed should be documented.

As soon as practicable after the emergency is under control, actions under consideration for funding by FEMA that may adversely affect NMFS listed species or designated critical habitat should be submitted to NMFS pursuant to the PBO's implementation procedures or as individual ESA consultation requests. For actions completed during the emergency response, we request FEMA prepare a post-project assessment report. At a minimum, the report should include the following:

1. A description of the construction activity performed;

2. A description of all of the measures implemented to avoid adverse effects to listed species, designated critical habitat, and essential fish habitat;

3. Pre (if available) and post color photographs of the site;

4. Report any observations of listed species during the emergency project;

5. A description of the amount of in-water, bank, and riparian habitat affected by the emergency action;

6. Measures to compensate for the project's adverse effects to listed species, designated critical habitat, and essential fish habitat;

7. Information about the species, number, and behavior of any ESA-listed marine mammals and sea turtles observed in the vicinity of project activities; and

8. Any information about black abalone presence and relocation that occurs during project activities as determined in coordination with NMFS WCR.

The above measures and AMMs identified in the PBO, when implemented, should minimize the adverse effects of emergency response operations on NMFS listed species, designated critical habitat, and EFH. Please contact Dereka Chargualaf at 707-575-6088 or Dereka.Chargualaf@noaa.gov if you have any questions related to these comments or would like additional information.

Sincerely,

Gary Stern

Gary Stern
San Francisco Bay Branch Chief
North-Central Coast Office

Enclosure

cc: Adam Klatzker, FEMA Region IX (adam.klatzker@fema.dhs.gov)
Copy E-Folder FRN 151422WCR2023SR00026

Table 1: ESA-listed species and designated critical habitat in affected counties in California under the jurisdiction of NMFS

Species	ESA Status	Critical Habitat
Black abalone *(Haliotis cracherodii)*	endangered (74 FR 1937; February 13, 2009)	critical habitat (76 FR 66806; October 27, 2011)
White abalone (*Haliotis sorenseni)*	endangered (66 FR 29046; June 28, 2001)	N/A
California Coastal (CC) Chinook salmon ESU *(Oncorhynchus tshawytscha)*	threatened (70 FR 37160; June 28, 2005)	critical habitat (70 FR 52488; September 2, 2005)
Central California Coast (CCC) coho salmon ESU (*O. kisutch*)	endangered (70 FR 37160; June 28, 2005)	critical habitat (64 FR 24049; May 5, 1999)
Central California Coast (CCC) steelhead DPS (*O. mykiss*)	threatened (71 FR 834; January 5, 2006)	critical habitat (70 FR 52488; September 2, 2005)
Central Valley (CV) spring-run Chinook salmon ESU (*O. tshawytscha*)	threatened (70 FR 37160; June 28, 2005)	critical habitat (70 FR 52488; September 2, 2005)
Central Valley steelhead DPS *(O. mykiss)*	threatened (71 FR 834; January 5, 2006)	critical habitat (70 FR 52488; September 2, 2005)
North American green sturgeon Southern DPS (*Acipenser medirostris*)	threatened (71 FR 17757; April 7, 2006)	critical habitat (74 FR 52300; October 9, 2009)
Northern California (NC) steelhead DPS *(O. mykiss)*	threatened (71 FR 834; January 5, 2006)	critical habitat (70 FR 52488; September 2, 2005)
Sacramento River (SR) winter-run Chinook salmon ESU *(O. tshawytscha*)	endangered (70 FR 37160; June 28, 2005)	critical habitat (58 FR 33212; June 16, 1993)

Species	ESA Status	Critical Habitat
South-Central California Coast (S-CCC) steelhead DPS (*O. mykiss*)	threatened (71 FR 834, January 5, 2006)	critical habitat (70 FR 52488; September 2, 2005)
Southern California (SC) steelhead DPS *(O. mykiss)*	endangered (71 FR 834, January 5, 2006)	critical habitat (70 FR 52488; September 2, 2005)
Southern DPS eulachon *(Thaleichthys pacificus)*	threatened (75 FR 13012; March 18, 2010)	critical habitat (76 FR 65324; October 20, 2011)
Southern Oregon/Northern California Coast (SONCC) coho salmon ESU *(O. kisutch)*	threatened (70 FR 37160; June 28, 2005)	critical habitat (64 FR 24049; May 5, 1999)
Leatherback Sea Turtle *(Dermochelys coriacea)*	endangered (35 FR 8491; June 3, 1970)	critical habitat (77 FR 4169; February 27, 2012)
North Pacific Ocean DPS Loggerhead Sea Turtle *(Caretta caretta)*	endangered (76 FR 58868; October 24, 2011)	N/A
East Pacific DPS Green Turtle *(Chelonia mydas)*	threatened (81 FR 20057; May 6, 2016)	N/A
Mexico DPS Humpback Whale *(Megaptera novaeangliae)*	threatened (81 FR 62259; October 11, 2016)	critical habitat (86 FR 21082; May 21, 2021)
Central America DPS Humpback Whale	threatened (81 FR 62259; October 11, 2016)	critical habitat (86 FR 21082; May 21, 2021)
Blue Whale *(Balaenoptera musculus)*	endangered (35 FR 18319; December 2, 1970)	N/A
Fin Whale (*Balaenoptera physalus)*	Endangered (35 FR 8491; June 2, 1970)	N/A
Western North Pacific DPS Gray Whale *(Eschrichtius robustus)*	Endangered (35 FR 8491; June 2, 1970)	N/A

Species	ESA Status	Critical Habitat
Southern Resident (SR) DPS Killer Whales *(Orcinus orca)*	endangered (70 FR 69903; November 18, 2005)	Critical habitat (71 FR 69054; November 29, 2006)
Guadalupe Fur seal *(Arctocephalus townsendi)*	threatened (50 FR 51252; January 15, 1986)	N/A
Western DPS Stellar Sea Lion *(Eumetopias jubatus)*	endangered (62 F 24345; May 5, 1997)	N/A

Table 2: Essential Fish Habitat in affected counties in California under the jurisdiction of NMFS

Coastal Pelagic Species FMP
Highly Migratory Species FMP
Pacific Coast Salmon FMP
Pacific Coast Groundfish FMP

West Coast Region NMFS FEMA Programmatic Agreement

This portion of the document includes an incidental take statement with reasonable and prudent measures and non-discretionary terms and conditions that are necessary and appropriate to avoid, minimize, or monitor incidental take of listed species associated with the program. Additionally, NMFS's review of the likely effects of the proposed action on essential fish habitat (EFH) for Pacific Coast Salmon, Coastal Pelagic Species, Pacific Coast Groundfish, and Highly Migratory Species, designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including conservation recommendations.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
650 Capitol Mall, Suite 5-100
Sacramento, California 95814-4700

Refer to NMFS No.: WCR-2017-8340

September 25, 2018

Alessandro Amaglio
Environmental Officer
Federal Emergency Management Agency
U.S. Department of Homeland Security
Region IX
1111 Broadway, Suite 1200
Oakland, California 94607-4052

Re: Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response and Fish and Wildlife Coordination Act Recommendations for the Disaster, Mitigation, and Preparedness Programs in California

Dear Mr. Amaglio:

Thank you for your letter of November 15, 2017, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Federal Emergency Management Agency's Disaster, Mitigation and Preparedness Programs in California. This letter transmits NMFS' biological opinion (BO) based on information provided in the biological assessment provided on November 15, 2017, and email discussions between NMFS and Federal Emergency Management Agency clarifying project description and effects of the project. A complete administrative record of this consultation is on file at the NMFS California Central Valley Office.

Based on the best available scientific and commercial information, the BO concludes that the Federal Emergency Management Agency's Disaster, Mitigation and Preparedness Programs (Programmatic) is not likely to jeopardize the continued existence and is not likely to destroy or adversely modify the designated critical habitat of 13 federally listed:

North American green sturgeon (*Acipenser medirostris*) Southern DPS,
California coastal Chinook (*O. tshawytscha*),
Central Valley Spring-run Chinook (*O. tshawytscha*),
Sacramento River Winter-run Chinook (*O. tshawytscha*),
Southern Oregon/Northern California Coast Coho (*O. kisutch*),
Central California Coast Coho (*O. tshawytscha*),
Southern California Steelhead (*O. mykis*s),
South-Central California Coast Steelhead (*O. mykiss*),

Northern California Steelhead (*O. mykiss*),
Central Valley Steelhead (*O. mykiss*),
Central California Coast Steelhead (*O. mykiss*),
Southern DPS Eulachon (*Thaleichthys pacificus*), or
Black abalone (*Haliotis cracherodii*).

NMFS has included an incidental take statement with reasonable and prudent measures and non-discretionary terms and conditions that are necessary and appropriate to avoid, minimize, or monitor incidental take of listed species associated with the program.

This letter also transmits NMFS's review of the likely effects of the proposed action on essential fish habitat (EFH) for Pacific Coast Salmon, Coastal Pelagic Species, Pacific Coast Groundfish, and Highly Migratory Species, designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including conservation recommendations. This review was pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation. We concluded that the project would adversely affect the EFH of Pacific Coast Salmon, Coastal Pelagic Species, and Pacific Coast Groundfish in the action area and have included recommendations.

Please contact Abbie Moyer in NMFS' California Central Valley Office at (916) 930-3707 or via email at Abbie.Moyer@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Maria Rea

for Barry A. Thom
Regional Administrator

Cc: To the file: 151422-WCR2017-SA00388
Lorena Solorzano-Vincent, lorena.solorzano-vincent@aecom.com
Alessandro Amaglio, alessandro.amaglio@fema.dhs.gov

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
650 Capitol Mall, Suite 5-100
Sacramento, California 95814-4700

Endangered Species Act (ESA) Section 7(a)(2) Programmatic Biological Opinion, Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response, and Fish and Wildlife Coordination Act Recommendations for the

Federal Emergency Management Agency's Disaster, Mitigation, and Preparedness Program in California

National Marine Fisheries Service (NMFS) Consultation Number: *WCR-2017-8340*

Action Agency: Federal Emergency Management Agency, Region IX Oakland, California

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely To Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
North American green sturgeon (*Acipenser medirostris*) Southern DPS	Threatened	Yes	No	Yes	No
California Coastal Chinook (*O. tshawytscha*)	Threatened	Yes	No	Yes	No
Central Valley Spring-run Chinook (*O. tshawytscha*)	Threatened	Yes	No	Yes	No
Sacramento River Winter-run Chinook (*O. tshawytscha*)	Endangered	Yes	No	Yes	No
Southern Oregon/Northern California Coast Coho (*O. kisutch*)	Threatened	Yes	No	Yes	No
Central California Coast Coho (*O. tshawytscha*)	Endangered	Yes	No	Yes	No
Southern California Steelhead (*O. mykis*s)	Endangered	Yes	No	Yes	No
South-Central California Coast Steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No
Northern California Steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No
California Central Valley Steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No
Central California Coast Steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No
Southern DPS Eulachon (*Thaleichthys pacificus*)	Threatened	Yes	No	Yes	No
Black abalone (*Haliotis cracherodii*)	Endangered	Yes	No	Yes	No

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes
Coastal Pelagic Species	Yes	Yes
Pacific Coast Groundfish	Yes	Yes
Highly Migratory Species	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By:

Barry A. Thom
Regional Administrator

Date: **September 25, 2018**

TABLE OF CONTENTS

List of Acronyms

AMM	Avoidance Minimization Measures
BA	biological assessment
BCSSRP	Battle Creek Salmon and Steelhead Restoration Program
BO	Biological Opinion
BRT	Biological Review Team
°C	Degrees Celsius
Cal OES	California Office of Emergency Services
CCV	California Central Valley
CDFG	California Department of Fish and Game
CDFW	California Department of Fish Wildlife
CRF	Code of Federal Regulations
cfs	Cubic Feet per Second
CNFH	Coleman National Fish Hatchery
CV	Central Valley
CVP	Central Valley Project
CVFPB	Central Valley Flood Protection Board
CWA	Clean Water Act
dB	Decibels
DDT	Dichlorodiphenyltrichlor
Delta	Sacramento-San Joaquin Delta
DO	Dissolved Oxygen
DPS	distinct population segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
°F	Degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FI	Functionally Independent
FMP	Fisheries Management Plan
FRFH	Feather River Fish Hatchery
ha	Hectare
HAPC	Habitat Area of Particular Concern
HU	Hydrologic Unit
ITS	Incidental Take Statement
IWM	Instream Woody Material
km	Kilometer
LSNFH	Livingston Stone National Fish Hatchery
LWD	Large Woody Debris
LWM	Large Woody Material
m	Meter
MHHW	Mean Higher High Water
MLLW	Mean Lower Low Water
MOU	Memorandum of Understanding
MSA	Magnuson-Stevens Fishery Conservation and Management Act

nDPS	Northern Distinct Population Segment
NFIP	National Flood Insurance Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PBA	Programmatic Biological Assessment
PBO	Programmatic Biological Opinion
PBF	Physical Biological Feature
PCE	Primary Constituent Elements
PFMC	Pacific Fisheries Management Counsel
PI	Potentially Independent
RBDD	Red Bluff Diversion Dam
RHA	Rivers and Harbors Act
RM	River Mile
RPA	Reasonable and Prudent Alternative
RRCSCBP	Russian River Coho Salmon Captive Broodstock Program
SDFPF	Skinner Delta Fish Protection Facility
sDPS	Southern Distinct Population Segment
SRA	Shaded Riverine Aquatic
SWP	State Water Project
TCD	Temperature Control Device
TFCF	Tracy Fish Collection Facility
TRT	Technical Review Team
USACE	United State Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
VSP	Viable Salmonid Populations
WS-RLO	Rickettsiales-like Organism
YOY	Young of Year

Note: Throughout this document there are references cited as CDFG. This refers to the California Department of Fish and Game. This name was changed to California Department of Fish and Wildlife on January 1, 2013. However, for consistency on publications, references prior to January 1, 2013, will remain CDFG.

Tables

Figures

1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (BO) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available through NMFS' Public Consultation Tracking System https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts. A complete record of this consultation is on file at NMFS California Central Valley Office.

1.2 Consultation History

This programmatic BO is the culmination of several years of collaboration with FEMA and NMFS. In 2011, FEMA developed a programmatic approach for ESA compliance with NMFS, which lead to the preparation of a programmatic biological assessment (PBA). The key elements of these coordination efforts between FEMA and NMFS, which have led to the preparation of this BO, include:

September 2011, FEMA sent a fact sheet on the PBA Framework to NMFS;

January 2012, FEMA and NMFS held a meeting to discuss the PBA;

From 2012 through 2014, FEMA sent various interim draft sections of the PBA and other draft documents to NMFS;

From 2014 through 2016, FEMA and NMFS participated in recurring calls for coordination;

October 22, 2015, FEMA submitted the Draft FEMA PBA for NMFS to review;

January 2016, NMFS sent FEMA comments on the Draft FEMA PBA;

Throughout 2016, NMFS and FEMA participated in regular calls and exchange of interim draft documents for this programmatic consultation;

March 2017 through October 2017, FEMA submitted additional draft sections of the FEMA PBA document, and NMFS and FEMA participated in weekly coordination calls;

November 15, 2017, FEMA submitted the Final FEMA PBA to NMFS;

December 19, 2017, NMFS submitted questions to FEMA regarding the Final PBA, following NMFS's sufficiency review;

December 21, 2017, FEMA responded to NMFS's questions;

December 21, 2017, NMFS initiated formal consultation.

1.3 Proposed Federal Action

"Action" means "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies" (50 CFR § 402.02). The proposed action is designed to provide a programmatic consultation to cover typical recurring disaster reponse, recovery, mitigation, and preparedness program actions funded by FEMA in California. The intent of undergoing this programmatic consultation is to cover many of the typical reoccurring actions funded by FEMA in California that effect listed species and designated critical habitat under the jurisdiction of NMFS. This would allow FEMA to more effectively prepare for and respond to disasters, enabling FEMA to expedite recovery from a disaster while meeting the requirements of the ESA, and reducing impacts of disaster, mitigation and preparedness actions on the environment.

The proposed action for this consultation is a "mixed programmatic action," as defined by 50 CFR § 402.02, because it approves some actions that are not subject to further section 7 consultation (referred to as Standard Actions), as well as a framework for the development of future actions that would be authorized at a later time (referred to as Framework Actions). For the actions authorized at a later time, take of listed species would not occur until that subsequent authorization. For the non-framework actions, including construction activities, this biological opinion (BO) will serve as the final ESA consultation and, as required by section 7 of the ESA, with respect to those actions NMFS is providing an incidental take statement with this BO. For the Framework Actions a programmatic level of analysis is completed but lack sufficient detail to analyze to the level of take; therefore, those activities are not expected to occur until further authorization and section 7 analysis is completed (see Section 1.3.3 Description of Framework Actions).

Under 50 CFR § 402.02, "interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR § 402.02). Interrelated and interdependent actions that are reasonably certain to occur as part of a preparedness, response, recovery, or mitigation activity include the continued operation and maintenance of structures and facilities included in the proposed action.

1.3.1 Overview of Proposed Action

FEMA administers federal grant programs to assist with preparedness, response, recovery, and mitigation for natural and human-caused disasters. These disasters can result from natural events, such as floods, earthquakes, wildfires, rains, and windstorms; and human-caused events, such as fires and terrorist attacks. When administering these federal grant programs, FEMA must comply with applicable Federal statutes, including the ESA and MSA. FEMA has determined that the majority of typical recurring actions proposed for funding, and for which a BO is required, can be consulted on in a programmatic manner, as described in this BO.

Over a five year period, this BO is designed to cover many of the typical recurring actions funded through these grant programs in California. For a proposed action to be covered under this BO, the project must meet the suitability criteria for ESA compliance and the suitability criteria for MSA compliance outlined below in Section 1.3.7 and 1.3.8, must follow the applicable Avoidance and Minimization Measures (AMM) outlined below in Section 1.3.9, and must be agreed upon by FEMA and NMFS. If a proposed project does not meet the criteria outlined below, an individual ESA consultation would be required. As the federal action agency, FEMA is ultimately responsible for determining if a project is covered under this BO, and for implementing the applicable AMMs and conservation measures.

This proposed action requires avoidance and minimization measures specific to an activity type to reduce and avoid effects of the action on federally listed species, designated and proposed critical habitat, and EFH. These include adherence to construction work windows, erosion and sedimentation prevention measures, spill prevention measures, biological monitoring, environmental awareness training for construction personnel, integration of NMFS guidance on fish passage design and fish screening criteria, and implementing bioengineering techniques.

The projects funded through FEMA's Disaster, Mitigation and Preparedness Programs in California that are included as part of the proposed action but would be authorized at a later time (Framework Actions) include the following:

- Constructing, Modifying, or Relocating Facilities
    - Upgrading or Modifying Facilities
    - Providing Temporary Facilities
    - Acquiring and Demolishing Existing Facilities
    - Constructing New Facilities or Relocating Existing Facilites
    - Developing Demonstration Projects

- Actions Involving Watercourses and Coastal Features
    - Constructing a Water Detention, Retention, Storage, or Conveyance Facility
    - Constructing Other Flood Control Structures.

These actions are fully described in Section 1.3.3. Table 1 provides a complete summary of the project types that are considered Framework Actions in this BO.

The projects funded through FEMA's Disaster, Mitigation and Preparedness Programs in California that are included as part of the proposed action and are not subject to future section 7 consultation (Standard Actions) include the following:

- Non-Emergency Debris Removal
- Constructing, Modifying, or Relocating Facilities
    - Repairing, Realigning, or Otherwise Modifying Roads, Trails, Utilities, and Rail Lines
    - Relocating the Function of an Existing Facility
- Actions Involving Watercourses and Coastal Features
    - Repairing, Stabilizing, or Armoring Embankments
    - Constructing a Water Crossing
    - Constructing an Existing Coastal Feature
- Wildfire Risk Reduction
    - Mechanical or Hand Clearing of Vegetation
    - Biological Control.

These actions are fully described in Section 1.3.4. Table 1 provides a complete summary of all the project types that are considered Standard Actions in this BO.

FEMA shall prepare an annual report (for each of the 5 years covered by this BO) to NMFS containing a summary of the numbers and types of projects completed under this programmatic. This annual report would include a tabular summary of the projects implemented that were covered under this programmatic each year. An accounting of take based on a number of individuals or disturbance to suitable habitat as a surrogate would be provided in the annual report, which would also include a tally of the total from all prior years.

1.3.2 Disaster, Mitigation, and Preparedness Programs

This BO covers projects that FEMA administers for disaster preparedness, response, recovery, and mitigation in California. Under these programs, FEMA provides Federal financial assistance to projects completed by State and territorial governments; Federally-recognized tribes; local governments, including cities, counties, special districts, and other local and regional entities; certain private non-profit organizations; and individuals and households. Generally, these programs fall into two categories: disaster and non-disaster programs. Both Standard and Framework Actions may be administered by these programs.

1.3.2.1 Disaster Programs:

FEMA is authorized to provide disaster assistance by the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. §§ 5121–5207), as amended ("Stafford Act"). Pursuant to the Stafford Act, the President may declare an emergency or major disaster when an event exceeds the capabilities of State, local, and tribal governments to respond and recover. This declaration enables FEMA to make supplemental assistance available, either directly through Department of Defense and other Federal agencies, or through financial assistance programs. Financial assistance programs are generally funded through Congressional appropriations in the Disaster Relief Fund, which Congress replenishes periodically. Pursuant to the Stafford Act, FEMA provides funds through the following:

- Programs to help individuals and households who have been affected by the disaster, including assistance with minor home repairs, temporary housing, transportation, medical assistance, funeral assistance, crisis counseling, and disaster legal services; extraordinary costs of State, territorial, tribal, and local governments for measures to save lives, protect public health and safety, and protect improved property;

- Repair or replacement of disaster-damaged buildings and infrastructure owned by State, territorial, tribal, and local governments, and by certain private non-profit entities (such as hospitals, schools, and electrical cooperatives);

- Alternate projects, in situations where a public or private non-profit facility owner determines that it is not in the public's interest to restore a disaster-damaged facility;

- As part of the repair of a disaster-damaged facility, implementation of cost-effective measures to reduce the risk of damage to that facility in future, similar disasters;

- State-, territory-, and tribally-managed hazard mitigation programs to reduce the risks associated with future disasters through community-wide and facility-specific mitigation measures; and

- Assistance to States, territories, and tribes for extraordinary costs associated with fighting wildfires, including measures to reduce post-fire erosion, flooding, and debris flows.

For some of these activities, the costs are shared between FEMA and the State.

1.3.2.2 Non-Disaster Programs

FEMA also implements a wide range of non-disaster financial assistance programs under the authority of several laws. In general, Congress provides funding for these programs through annual appropriation, and the Federal share of program costs varies. These programs include the following:

- State-, territory-, and tribally-managed hazard mitigation programs.

- Planning, project, and technical assistance to States, territories, tribes, and local governments to reduce the risk of flood damage to public and privately owned buildings, thereby reducing the financial impact of flooding.

- Programs to enhance the preparedness of States, territories, tribes, local governments, and urban areas through financial assistance for planning, training, exercises, and the purchase of systems and equipment. These programs include funding for State emergency management agencies, regional organizations, law enforcement and firefighting agencies, medical services providers, transportation providers, operators of critical infrastructure, and organizations devoted to the preparedness of the general public.

1.3.3 Description of Framework Actions

1.3.3.1 Constructing, Modifying, or Relocating Facilities

As a Framework Action, FEMA may provide funds for constructing, modifying, or relocating facilities. Relevant actions include (Table 1):

- Upgrading or otherwise modifying structures;
- Providing temporary facilities;
- Acquiring and demolishing existing facilities;
- Constructing new facilities or relocating existing facilities; and
- Developing demonstration projects.

During construction, avoidance and minimization measures would be used and incorporated as part of the action (see Section 1.3.9 Avoidance and Minimization Measures).

1.3.3.1.1 Upgrading or Otherwise Modifying Facilities

As a Framework Action, FEMA may provide funds to implement changes required by current building codes and standards, or otherwise modify existing structures (Table 1). Often, these changes make the structure more resistant to damage in future events. Typical activities would include:

- Making structures more fire-resistant (e.g., by replacing roofs and doors with fire-resistant materials);
- Installing bracing, shear panels, shear walls, anchors, or other features so that structures are better able to withstand seismic events or high wind or snow loads;
- Modifying structures to reduce the risk of damage during floods by elevating structures above the expected flood level or by floodproofing; and
- Modifying structures to meet another need of a subapplicant, such as through an improved project or an alternate project.

A structure can also be floodproofed so that floodwaters can encounter it without causing damage to the structure or its contents. Dry floodproofing methods involve the installation of flood shields, watertight doors and windows, earthen barriers, and pumping systems to prevent water from entering the structure. Wet floodproofing involves the installation of vents and flood-resistant materials so that water may enter and leave areas of the structure without causing damage. With both dry and wet floodproofing, utilities must be modified, elevated, or relocated to prevent floodwaters from accumulating within them.

1.3.3.1.2 Providing Temporary Facilities

As a Framework Action, FEMA may provide temporary housing facilities when a disaster renders homes uninhabitable for long periods (Table 1). Such facilities typically consist of manufactured housing. Typical activities may involve:

- Developing the pads for dwellings;
- Constructing ancillary facilities, such as roads, streets, and parking lots;
- Installing utilities, such as potable water lines, sewer hookups, electricity (including street lighting), and telephones lines; and
- Installing manufactured homes.

Additionally, FEMA may modify existing facilities to serve as temporary housing. Appropriate sites would not be located in a floodplain and would not contain wetlands or critical habitat, affect historic properties or archaeological sites, or contain hazardous materials. Installation of housing units and utilities would be accomplished in accordance with current codes and standards. After temporary housing is no longer needed at the disaster site, FEMA would remove the temporary housing units and associated ancillary facilities, and restore the land to its original use. All removed materials would be stored for future use or disposed of in accordance with applicable laws and regulations.

Another method that FEMA would use to provide temporary housing involves modifying existing facilities to serve as temporary housing. These facilities could consist of existing residential property or the adaptive reuse of non-residential facilities. Specific activities would range from conducting repairs and minor upgrades to complete reconstruction of a building's interior. This action may involve acquisition or leasing of facilities. Modifying existing facilities for temporary housing may be conducted by FEMA directly or by providing funding to a recipient (subapplicant).

FEMA may also provide funding for temporary relocation of essential public services, in the event that the structures that house these services are damaged, destroyed, or otherwise rendered inaccessible by a disaster. Funds may also be provided for upgrades necessary to meet current codes and standards, and for the installation or modification of appurtenances, such as utilities, that are necessary to operate facilities.

1.3.3.1.3 Acquiring and Demolishing Existing Facilities

As a Framework Action, FEMA may provide funds for the acquisition and demolition of existing facilities, particularly if they are located in high-hazard areas and are subject to repetitive loss (Table 1). Typically, these facilities are at a high risk because of: (1) damage from flooding; (2) erosion of stream banks, beaches, slopes, or bluffs; (3) landslides; or (4) wildfire. These facilities may consist of private properties, such as houses and commercial buildings, or publicly owned facilities, such as utilities, roads, and bridges. A local government entity would purchase private properties on a willing-seller basis and, after the property is purchased, the property would be dedicated and maintained in perpetuity for uses compatible with open space, recreation, or wetlands management practices, pursuant to 44 CFR Part 206.434(e).

Existing facilities would be either removed or demolished. All demolition materials would be disposed of at approved and licensed disposal sites, in compliance with applicable laws and regulations. Any hazardous materials or other contaminants would be removed and disposed of in an appropriate manner. Construction debris and household materials may be recycled if recycling facilities exist. Once structures are removed, lots would be graded to conform to the local topography, and disturbed areas would be revegetated with species approved for the local area. Frequently, the local government would develop the acquired land for recreational or open space uses, such as parks, athletic fields, or walking and biking trails.

1.3.3.1.4 Constructing New Facilities or Relocating Existing Facilities

If a facility is located in a floodplain or other hazardous area,[1] is subject to repetitive damage, or has been damaged in such a way that restoration in the current location is not practical or cost-effective, as a Framework Action, FEMA may fund the construction of a new facility or the physical relocation of the existing facility (Table 1). Examples of this action include construction of roads, trails, utilities and utility lines, and rail lines in a different area from the existing facility; construction and relocation of buildings; and construction of drainage improvements.

In both new facility construction and physical relocation, FEMA may fund the cost of land acquisition and the construction of appurtenant features, such as access roads and utilities. For properties in the hazard area, FEMA would acquire damaged properties, demolish existing structures (except in cases of physical relocation), and places deed restrictions that would limit future uses to open space in perpetuity. However, FEMA does not acquire land directly nor does it become a land owning agency as a result of this process.

1.3.3.1.5 Developing Demonstration Projects

Demonstration projects focus on public education and are designed to highlight procedures that the public can use to reduce property damage during flood, earthquake, wildfire, wind, and rainstorm disasters and may qualify as Framework Actions. Demonstration projects may involve the development of a model facility to demonstrate how hazard mitigation technologies can be used to reduce potential damage during a disaster. Flood demonstration projects may involve items such as elevating a structure or waterproofing windows and doors that are below the base flood elevation. A fire demonstration project may include vegetation management around a facility and replacing roofs, doors, and windows with fire-resistant materials. Wind and

[1] Hazard areas are susceptible to some type of natural hazard, such as flooding, seismic activity, coastal inundation, or mudslide.

earthquake demonstration projects may include changes to the structural design of buildings to allow them to withstand higher wind velocity or more movement during an earthquake.

1.3.3.2 Actions Involving Watercourses and Coastal Features

Framework Actions include some projects involving watercourses and coastal features (Table 1).

Relevant categories of activities include the following:

- Constructing or modifying a water detention, retention, storage, or conveyance facility; and
- Constructing, repairing, or modifying coastal and other flood control structures

During construction, avoidance and minimization measures would be used and incorporated as part of the action (see Section 1.3.9 Avoidance and Minimization Measures).

1.3.3.2.1 Constructing a Water Detention, Retention, Storage, or Conveyance Facility

Constructing a water detention, retention, storage, or conveyance facility may include the construction, enlargement, or restoration of detention basins, retention basins, sediment ponds, reservoirs, or conveyance facilities, such as irrigation ditches or flumes, to reduce flood flows or to provide a water source for fighting fires in an area of high fire hazard. The creation and/or enlargement of water storage reservoirs would be most frequently associated with flood disasters and to a lesser extent, fire disasters.

Detention basins, retention basins, sediment ponds, and reservoirs would be constructed to temporarily store floodwater to reduce downstream peak flows. The stored water would be released at a slower rate so that the existing drainage-ways can convey water without contributing to downstream flooding. All areas that would be disturbed during the construction of these features would be revegetated with native plant species. This action would also include the repair or restoration of water retention or conveyance structures. All sediment removed from these features would be disposed of in a manner consistent with Federal, State, and local laws and regulations.

Frequently in rural areas, firefighting is heavily constrained by the lack of water that firefighters can use. In response to this need, proposed activities may also include the creation of retention facilities in locations that firefighters can readily access, either as a direct source of water or as a source of water to fill water supply trucks. All areas that would be disturbed during the construction of a retention facility would be revegetated with native plant species.

1.3.3.2.2 Constructing Coastal and other Flood-Control Structures

Coastal structures protect shorelines and coastal features from erosion and manage sediment transport. A flood-control structure is a facility designed to reduce the risk that floodwaters could inundate a flood-prone area. Typical examples are levees (also referred to as dikes) and floodwalls. Activities would include:

- Constructing, replacing, or modifying seawalls, groins, jetties, revetments, levees, dikes, and floodwalls
- Modifying or installing interior drainage systems to reduce the risk of damage behind levees and floodwalls during heavy rains or flooding events on streams located in protected areas.
- Modifying or installing new bank protection of a shoreline structures
- Raising the height of existing flood control structures to prevent overtopping in future floods

Levees would be repaired or constructed using bioengineering techniques, compacted fill (discussed in the Avoidance and Minimizaion Measures Section 1.3.9) and, in some cases, riprap protection. Bare earth would be seeded with grasses to prevent erosion. Typically, a gravel road would be installed on the levee's crest to allow for maintenance. Floodwalls, typically built in urban areas, would be constructed using reinforced concrete or grouted, reinforced concrete block. Excavation would be necessary to install footings. Levees and floodwalls would both have interior drainage systems that may include pumps for removing accumulated water.

1.3.4 Description of Standard Actions

1.3.4.1 Non-Emergency Debris Removal

Standard Actions include projects involving non-emergency debris removal (Table 1). 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.

Removal of material from stream channels usually requires coordination with the United States Army Corps of Engineers (USACE) for compliance and permitting under the Clean Water Act (CWA) and Rivers and Harbors Act (RHA). All removed debris would be disposed of at approved and licensed disposal sites, in compliance with existing laws and regulations. Any hazardous materials or other contaminants would be removed and disposed of in an appropriate manner. Woody debris and construction materials can be recycled if recycling facilities exist.

1.3.4.2 Constructing, Modifying, or Relocating Existing Facilities

As a Standard Action, FEMA may provide funds for constructing, modifying, or relocating existing facilities (Table 1). Relevant actions include:

- Repairing, realigning, or otherwise modifying roads, trails, utilities, and rail lines; and
- Relocating the function of an existing facility.

During construction, avoidance and minimization measures would be used and incorporated as part of the action (see Section 1.8 Avoidance and Minimization Measures).

1.3.4.2.1 Repairing, Realigning, or Otherwise Modifying Roads, Trains, Utilities, and Rail Lines

Roads, trails, utilities,[2] and rail lines are typically damaged when floods cause structural damage, or when floods or heavy rains cause erosion, subsidence, or landslides. Earthquakes may cause similar damage. Repairs would be accomplished by replacing earthen material lost during the disaster and replacing the damaged surface, utility line, or, in the case of rail lines, ballast, and track. Stabilizing the replacement fill using rock, grout, timber walls, or steel sheet piling may be necessary. Hazard mitigation measures may be performed to prevent or limit future damage. For example, a pipe may be installed to convey drainage beneath a road, thus preventing future washouts, or a utility line may be encased in concrete in an area vulnerable to erosion. Such projects may qualify as Standard Actions (Table 1).

If the area of damage is unstable, does not allow for repair, or is subject to repetitive loss, a facility may be realigned so that the area of damage is avoided. Property acquisition or a change in easement may be necessary.

Facilities may also be modified as part of improved projects or alternate projects under the Public Assistance Program to meet additional needs of the proposed action.

1.3.4.2.2 Relocating the Function of an Existing Facility

As a Standard Action, FEMA may fund the relocation of a function of a facility to an existing facility that has adequate capacity to handle the additional load with minor modifications, if necessary (Table 1). For structures, the occupants and materials would be relocated to alternative structures, traffic would use alternate routes, and utility services would be provided by alternative methods. This action would not entail any major physical construction or addition to the existing facility and, if any work is required, it would consist of only minor modifications. For properties in the hazard area, FEMA would acquire damaged properties, demolish existing structures, and place deed restrictions that would limit future uses to open space in perpetuity.

1.3.4.3 Actions Involving Watercourses and Coastal Features

Many FEMA activities pertain to inland water sources, such as streams, rivers, and lakes, and coastal features, such as harbors and beaches. Inland water sources may be perennial or dry during the summer months. Such projects may qualify as Standard Actions (Table 1). During construction, avoidance and minimization measures would be used and incorporated as part of the action. These typical measures are described in Section 1.3.9. Work in a stream channel often includes temporary diversion of the channel using sandbags or a cofferdam constructed of fill. Heavy equipment is typically operated from an adjacent road, bank, or other feature; however, in

[2] Utilities refer to water, sewer, natural gas, and power/electrical systems and similar types of infrastructure.

some cases, operating equipment in a channel area once flow has been diverted may be necessary. A pipe or a temporary secondary channel may be used to convey the diverted water.

If the action involves channel modifications, changes to the capacity of bridges and culverts, or the installation of attenuation structures, FEMA would conduct hydraulic/hydrologic analyses to evaluate the changes of upstream and downstream flow rates and determine whether additional action components need to be added to address any changes in hydraulics and hydrology outside the project area may be necessary.

Relevant categories of activities include the following:

- Repairing, stabilizing, or armoring embankments;
- Constructing or modifying an existing water crossing; and
- Constructing or modifying an existing coastal feature, such as groins, jetties and revetments.

During construction, avoidance and minimization measures would be used and incorporated as part of the action (see Section 1.3.9 Avoidance and Minimization Measures).

1.3.4.3.1 Repairing, Stabilizing, or Armoring Embankments

Repairing, stabilizing, or armoring embankments would involve the repair of earthen or rock embankments damaged by floodwaters. Such projects may qualify as Standard Actions (Table 1). Examples are natural stream banks (such as those in parks); road, trail, and rail line embankments; embankments for irrigation and navigation canals; and levees used for flood control and reclamation. In addition to repair of damaged features, FEMA may fund measures designed to prevent damage in future flood events.

Proposed streambank stabilization methods include alluvium placement, vegetated riprap with large wood (LW), log or roughened rock toe, woody plantings, herbaceous cover, deformable soil reinforcement, coir logs, bank reshaping and slope grading, floodplain flow spreaders, floodplain roughness, and engineered log jams (ELJs), alone or in combination.

1.3.4.3.2 Constructing a Water Crossing

As a Standard Action, FEMA may fund the repair or replacement of damaged water crossings, the enlargement of openings to allow greater conveyance and reduce the risk that debris would get trapped during floods, or the installation of bank protection or other means to reduce the risk of erosion (Table 1). Crossings may also be relocated or improved to avoid high-hazard areas, repetitive damage, or areas where reconstruction is not cost-effective or feasible.

Culverts may consist of corrugated metal pipes, reinforced concrete pipes, or reinforced concrete box culverts. The capacity of a culvert crossing may be increased to reduce the risk of flooding to the surrounding area, or the culvert may be modified to prevent overtopping or erosion of the crossing. Typical measures would include:

- Increasing the size of a culvert or adding culvert barrels;
- Changing the type of culvert; and
- Changing the location or alignment of a culvert.

Similarly, 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 would include:

- Widening existing openings or constructing new openings;
- Reconfiguring bracing to reduce the risk that debris would be trapped; and
- Replacing a multi-span structure with a clear-span structure.

A bridge may be installed to replace a culvert to increase the flow capacity of a crossing.

1.3.4.3.3 Repairing an Existing Coastal Feature

Constructing a coastal feature would involve the repair or replacement of facilities in coastal environments, such as estuaries, inlets, harbors, and beaches. Such projects may qualify as Standard Actions (Table 1). These facilities include:

- Recreational facilities, such as piers and boat ramps;
- Facilities for maritime use, such as docks and slips;
- Shoreline protection devices, such as seawalls, groins, jetties, and revetments; and
- Coastal flood-control structures, such as levees.

Construction activities would be expected to occur in water and involve driving piles, placing rock or soil, or dredging sand, mud, or other sediment.

1.3.4.4 Wildfire Risk Reduction

Vegetation management is intended to reduce the risk of loss and damage due to wildfire as described in Section 3.3. Vegetation management for wildfire risk reduction may be accomplished using mechanical means, hand-clearing, or grazing. Some activities may include a combination of these methods. Such projects may qualify as Standard Actions (Table 1). During construction, avoidance and minimization measures would be used and incorporated as part of the action (see Section 1.8 Avoidance and Minimization Measures).

Relevant categories of activities include

- Mechanical or hand clearing of vegetation, and
- Biological control.

1.3.4.4.1 Mechanical or Hand Clearing of Vegetation

Mechanical or hand clearing of vegetation would be used for the selective removal of vegetation so that a certain proportion of vegetation is left in place. This would be done to reduce the amount of vegetative fuels in an area where mechanical removal of vegetation is impractical or the remaining vegetation needs to be protected. Per FEMA's Wildfire Mitigation Policy (MRR-2-08-1) vegetation may be removed to create defensible space around buildings and structures, and to protect life and property beyond defensible space perimeters but proximate to (less than 2 miles from) at-risk structures. Such projects may qualify as Standard Actions (Table 1). The creation and maintenance of firebreaks, access roads, and staging areas is not eligible for FEMA funding.

In mechanical removal, heavy equipment would be used to uproot, crush, pulverize, or cut the trees and brush being removed. Hand removal would involve the use of chainsaws, axes, and hoes to cut and uproot vegetation. Depending on the location of the vegetation removal project and State and local regulations, vegetation downed as a result of mechanical or hand removal would be piled and burned on site, chipped and spread on site, or loaded and hauled away from the site. After the removal of the targeted vegetation, cleared areas would be revegetated with native, fire-resistant species. Vegetation hauled off-site could be recycled but must be disposed of in accordance with appropriate requirements.

1.3.4.4.2 Biological Control

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

Table 1. Summary of Standard Actions and Framework Actions

Project Types	Standard Actions	Framework Actions
Non-Emergency Debris Removal		
Non-Emergency Debris Removal	• Removing woody debris and other vegetation from events that damage or destroy trees • Removing rock and earth from landslides caused by events such as earthquakes or heavy rains • Removing rubble after earthquakes • 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 structures in such a manner as to disrupt normal flows, navigation, recreation, or municipal services • Hauling and disposing of debris	NA
Constructing, Modifying, or Relocating Facilities		
Airport Runway Construction	NA	• Repairing or realigning airport runways and associated structures • Constructing of new airport runways and associated structutres • Managing and/or removing wildlife
Road and Trail Construction	• Constructing or realigning existing roads, trails, or boardwalks • Repairing or replacing damaged roads and trails; including retaining walls, subsurface, and pavement • Regrading or improving existing gravel or dirt roads and trails • Repairing an existing low-water road crossing[3]	• Constructing new roads, trails, or boardwalks

Project Types	Standard Actions	Framework Actions
Utility Construction	• Constructing, repairing, or relocating existing 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 existing substations or other utility infrastructure • Constructing or installing temporary utilities including associated infrastructure • Installing electrical boxes for electrical transformers and switches and secondary utility boxes for telephone and cable	• Constructing new 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
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 • Repairing or replacing earthen material lost during disasters	NA
Facility Disaster Mitigation Activities[1]	NA	• 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 • 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

Project Types	Standard Actions	Framework Actions
Building and Facility Construction	NA	• Installing prefabricated manufactured structures (or temporary structures) including dwelling pads • Constructing safe rooms • Modifying existing buildings to serve as temporary housing • Acquiring and demolishing existing structures and buildings located in high-hazard areas • Constructing, repairing, or relocating new infrastructure (e.g., wastewater treatment plants, public buildings, and certain utilities)
Actions Involving Watercourses and Coastal Features		
Stormwater Management	NA	• Constructing, repairing, replacing, or modifying a stormwater management structures and associated infrastructure, including storm drains, pipelines, and outfalls.
Flood Control Activities	• Dredging of sediment and debris from existing flood control structures • Removing vegetation, rock, silt, or woody debris from flood control structures • Repairing existing levees and floodwalls	• Constructing, repairing, and realigning drainage swales, earthen channels, concrete channels, or subsurface concrete pipelines • Constructing, repairing, or replacing earthen banks or channel • Constructing 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 • Adding features to an existing culvert, such as a headwall, discharge apron, or riprap[2], to reduce the risk of erosion or damage to a culvert	NA

Project Types	Standard Actions	Framework Actions
Bridge Construction	• 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 • Installing protective features, such as concrete abutments or riprap[2], to reduce the risk of damage due to erosion and scour • Repairing an existing bridge structure, including from large bridges to pedestrian bridges • Replacing a multi-span structure with a clear-span structure	NA
Bank Protection, Stabilization, and Erosion Control Activities	• Repairing or replacing existing or placing new rock riprap[2] within stream channels, banks, or hillsides • Repairing or replacing existing or installing new retaining walls, 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)	• Repairing or replacing existing or hardening new areas with concrete or soil cement
Detention/Retention, or Basin Water Storage Facility Construction	• Repairing or replacing existing detention/retention basins, or sediment ponds	• Constructing new detention/retention basins or sediment ponds
Linear Water Conveyance Facility Construction	• Repairing or replacing irrigation ditches, canals, or flumes, and associated infrastructure	• Constructing or modifying irrigation ditches, canals, or flumes, and associated infrastructure
Shoreline Facilities - Recreational or Maritime Use	• Repairing or replacing existing boardwalks, piers, boat ramps, docks, and slips	• Constructing new boardwalks, piers, boat ramps, docks, and slips

Project Types	Standard Actions	Framework Actions
Shoreline Facilities – Protection	• Repairing existing seawalls, groins, jetties, revetments, levees, dikes, and floodwalls • Repairing interior drainage systems to reduce the risk of damage behind levees and floodwalls during heavy rains or flooding events on streams • Repairing existing bank protection of a shoreline structures • Repairing damaged shoreline structures	• Constructing, replacing, or modifying seawalls, groins, jetties, revetments, levees, dikes, and floodwalls • Modifying or installing interior drainage systems to reduce the risk of damage behind levees and floodwalls during heavy rains or flooding events on streams • Modifying or installing new bank protection of a shoreline structures • Raising the height of existing structures to prevent overtopping in future floods
Wildfire Risk Reduction		
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 • Preventing re-growth and re-sprouting of undesirable vegetation once an area has been cleared of excessive vegetation by mechanical means and/or hand removal • Grazing of cattle, horses, goats, sheep, or other livestock on grasses and other vegetation as a means of control	NA

Notes:

1 Project types may include development of demonstration projects of a natural disaster (*i.e.*, severe rain, flood, wildfire, wind, and earthquake) for public education and/or training purposes.
2 Utilization of riprap and concrete without bioengineering and vegetation is not covered under this BO
3 Culvert repairs, bridge repairs, and other water crossing repairs must meet the NMFS Guidelines for Salmonid Passage at Stream Crossings, included in Appendix B, or subsequent version

1.3.5 Not Included in this BO

This BO does not cover any actions that would necessitate emergency ESA consultations.

1.3.5.1 Emergency ESA Consultations in California

Section 7 of the ESA recognizes that emergencies (such as a disaster) involve situations which do not allow for normal consultation procedures to be followed. For example, some emergencies may require expedited consultation (50 CFR § 402.05). These ESA provisions allow for actions to be taken under an emergency situation to protect from the loss of human life and/or property, in coordination with proper notification to the USFWS and/or NMFS, and follow up with an after-the-fact consultation. This BO does not cover emergency situations or emergency consultations, as those would follow the standard procedures outlined under 50 CFR § 402.05.

1.3.6 Process for ESA and MSA Compliance

First, FEMA would determine if the project meets the suitability criteria for coverage under this programmatic consultation, described in Sections 1.3.7 and 1.3.8. If FEMA finds that an individual project qualifies for inclusion into FEMA's programmatic consultation for Disaster, Mitigation and Preparedness Programs in California as a Standard Action, FEMA will transmit that finding to NMFS using the ESA/MSA Review Form. An ESA/MSA Review Form (Appendix A) has been created for reporting the potential effects of covered projects to NMFS. FEMA would complete this form for proposed projects that could be covered under this programmatic consultation and submit the form to NMFS, requesting coverage. If NMFS agrees that the project qualifies, FEMA will not need to initiate individual consultation for such projects because their effects have been analyzed in this programmatic biological opinion. NMFS would confirm by email that the project is covered under this programmatic consultation as a Standard Action.

For Framework Actions included in FEMA's Disaster, Mitigation and Preparedness Programs in California, FEMA would determine if the proposed project meets the suitability criteria for ESA and/or MSA coverage. If the suitability criteria for ESA and/or MSA coverage are met, FEMA would determine whether the proposed project has the potential to adversely affect federally listed species, their critical habitat, and/or EFH covered in this BO. All Framework Actions will require additional consultation. Framework Actions that are “not likely to adversely affect” listed species may be covered through NMFS concurrence under this BO; the ESA/MSA Review Form may serve as the initiation package for these projects. Framework Actions that cause adverse impacts resulting in “take” are not covered under the incidental take statement for this consultation. For those actions, FEMA would submit the ESA/MSA Review Form with a streamlined biological assessment to NMFS and request a streamlined consultation. NMFS would then issue a streamlined BO.

If a proposed project does not meet the suitability criteria established in this BO, FEMA would request a separate individual consultation under the MSA and/or Section 7 of the ESA for that specific project.

1.3.7 FEMA's Proposed Suitability Criteria for ESA Coverage

As described in Section 1.4.2.1 in the PBA, FEMA has executed a Memorandum of Understanding (MOU) with USACE, the U.S. Fish and Wildlife Service (USFWS), and NMFS for FEMA-funded projects in California, Nevada, and Arizona. As stipulated in the MOU, FEMA is typically the Lead Federal Agency for FEMA-funded projects receiving USACE authorization through a Nationwide Permit (NWP) or Regional General Permit (RGP) issued by USACE under Section 404 of the Clean Water Act (CWA) or projects that do not require a Section 404 CWA permit. Since the MOU stipulates that the USACE would be the Lead Federal Agency for larger or more complex projects requiring an Individual Permit from USACE under Section 404 CWA, such projects would not be covered by this BO between NMFS and FEMA.

There are limitations placed on and general condition requirements for projects authorized through the NWP program by project type, as detailed in the 2017 USACE guidelines for NWPs (82 FR 1860). Similarly, RGPs place limitations on the geographic location, size, and scope of projects they cover. Some NWP authorizations only cover projects that have a disturbance footprint of 0.5 acre or less of waters of the U.S. including wetlands, and disturbance up to 500 linear feet or less of banks. For this BO, FEMA is adopting these limits and applying them more broadly to all project types.

This programmatic consultation does not provide ESA coverage for the recipient's (subapplicant) proposed projects that involve the following activities:

- Work that results in any adverse effects on federally listed species under NMFS jurisdiction that are not covered under this BO (i.e., marine mammals, sea turtles, white abalone) and/or their critical habitat, including any adverse effects to these species, including but not limited to take of such species (injury or mortality, capture and relocation, harassment), and habitat modification or degradation that could impair biological function such as breeding, feeding, or sheltering;

- A situation in which a subapplicant cannot or is not willing to implement the applicable avoidance and minimization measures included in this BO;

- Using pesticides, herbicides, or flame retardants in areas supporting listed species or their critical habitat;

- Blasting activities in areas supporting listed species or their critical habitat;

- Installing ***new*** outfalls (a point source as defined by 40 CFR 122.2) or water intakes in areas supporting listed species or their critical habitat, or areas directly connected to such areas (modifying and repairing outfalls may be covered);

- Altering existing water intakes in a manner that changes the ***capacity*** of the structure in areas supporting listed species or their critical habitat(the repair or replacement of existing intakes may be covered, but operation of the water intake would require a separate consultation);

- Repairing or replacing intakes that are ***not properly screened*** in accordance with NMFS fish screening criteria (NMFS 1997);
- Altering culverts and other water crossings in a manner that ***reduces*** the ability to pass migrating listed species (Note that culvert repairs, bridge repairs, and other water crossing repairs must meet the *NMFS Guidelines for Salmonid Passage at Stream Crossings*, included in Appendix B, or subsequent version);
- Construction of new or replacement of permanent low water crossings;
- ***Dredging (either for new construction or maintenance)*** in channels, open water bays, or estuaries; however, projects that involve the removal of disaster-related sediment or debris from waterways may be covered under this programmatic consultation;
- Creating a new water crossing structure (e.g., bridges and culverts), for which the recipient's (subapplicant) design ***cannot meet fish passage criteria*** established in NMFS guidelines (Appendix B, or subsequent version) or other applicable regional guidance such as the California Salmonid Stream Habitat Restoration Manual;
- The installation or replacement of riprap or other bank stabilization in suitable habitat or critical habitat for listed species that ***does not*** include the incorporation of bioengineering techniques or other design elements (see Appendix E for references and guidance) that provide for the establishment of appropriate wetland or riparian vegetation on the stabilized bank[3];
- Removing[4] woody riparian vegetation[5] within suitable habitat or critical habitat (proposed or designated) for listed species during project construction, ***without*** implementation of AMM-25, Revegetation of Stream Banks (Note that this does not apply to vegetation removed by disaster or the clearing of vegetative debris deposited by disaster),
- Conducting in-water work ***outside*** of the work windows specified in Appendix C;

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[3] For projects on Levees within the Central Valley, projects that implement the Vegetation Management Strategy of the Central Valley Flood Protection Plan (CVFPP) Conservation Strategy (DWR 2017) would meet this criterion. The Vegetation Management Strategy referenced allows for managed tree growth on the lower waterside slope of levees.

[4] Removal of vegetation refers to the removal woody riparian vegetation (as defined in the next footnote) as a result of project activities, including project construction, access routes, construction staging areas, and any other activities resulting from implementation of the funding recipient's (subapplicant) proposed project. Minor trimming of vegetation to allow for construction access is not considered "removal", as long as the trimming does not reduce canopy shade or impact survival of the trimmed vegetation.

[5] "Woody riparian vegetation" includes riparian trees and shrubs that are supported by perennially growing woody stems. Annuals, biennials, and perennials plants that overwinter via rootstocks (such as blackberry and reed grass) are not considered woody riparian vegetation.

- Construction of ***new*** dams, flood channels, water diversion structures, spillways, and other flood control stuctures such as levees and floodwalls (the construction of coastal flood control structures may be allowed);

- Projects that have disturbance areas ***greater than*** 0.5 acre of waters of the U.S. including wetlands, and/or disturbance of ***more than*** 500 linear feet of streambank and/or shoreline. NMFS may waive this limitation if FEMA has adequately demonstrated that the recipient's (subapplicant) proposed project would have effects that are insignificant, discountable, or wholly beneficial.

If a proposed project includes any of these activities, it would not be covered under this programmatic consultation, and may require an individual ESA consultation separate from this BO.

1.3.8 FEMA's Proposed Suitability Criteria for MSA Coverage

This BO does not provide MSA coverage for individual projects that involve the following activities:

- Using pesticides, herbicides, or flame retardants in areas designated as EFH;

- Blasting activities in EFH;

- Installing new outfalls (a point source as defined by 40 CFR 122.2) or intakes in EFH or areas connected to EFH;

- Altering existing intakes in a manner that changes the capacity of the structure in EFH. (The repair or replacement of existing intakes may be covered, but any consultation requirements for operation of the intake would require a separate consultation);

- Dredging (either for new construction or maintenance) in channels, open water bays, or estuaries; however, projects that involve the removal of disaster related sediment or debris from waterways may be covered under this BO;

- Construction of new dams, flood channels, water diversion structures, spillways, and other flood control structures such as levees and floodwalls (the construction of coastal flood control structures may be allowed);

- A situation in which the subapplicant cannot or is not willing to implement the applicable avoidance and minimization measures included in this BO, or suitable alternatives approved by NMFS, knowing that the implementation of those measures would avoid, minimize, or otherwise offset adverse effects to EFH; and

- Projects that have disturbance areas greater than 0.5 acre of waters of the U.S. including wetlands, and/or disturbance of more than 500 linear feet of streambank and/or shoreline. NMFS may waive this limitation if FEMA has adequately demonstrated that the recipient's (subapplicant) proposed project would have effects that are insignificant, discountable, or wholly beneficial.

Projects that do not meet the suitability criteria listed above would require an individual consultation outside of this BO to comply with the MSA.

1.3.9 Avoidance and Minimization Measures

This section describes avoidance and minimization measures that would be implemented to reduce the identified potential adverse effects from a subapplicant's proposed project. FEMA would be responsible for ensuring that each recipient (subapplicant) implements the avoidance and minimization measures identified as necessary for the proposed project.

1.3.9.1 General Construction Measures

AMM-1: Erosion and Sedimentation Prevention Measures

For projects that have the potential to cause erosion and introduce sedimentation into waters, wetlands, and riparian areas supporting listed species, the recipient (subapplicant) would prepare an Erosion Control Plan. The Erosion Control Plan would detail the erosion and sedimentation prevention measures required. As part of this plan, the recipient (subapplicant) would ensure that temporary sediment-control devices are installed and maintained correctly. For example, sediment would be removed from engineering controls once the sediment has reached one-third of the exposed height of the control. The devices would be inspected frequently (i.e., daily or weekly, as necessary) to ensure that they are functioning properly; controls would be immediately repaired or replaced or additional controls would 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, would be seeded with a regionally appropriate erosion control seed mixture. On soil slopes with an angle greater than 30%, erosion control blankets would be installed or a suitable and approved binding agent would be applied. Runoff would be diverted away from steep or denuded slopes.

Where habitat for listed fish species is identified within, or adjacent to, the project footprint, all disturbed soils at the site would undergo erosion control treatment before the rainy season starts and after construction is terminated. Treatment may include applying temporary native or non-native sterile-seed mix, weed-free certified straw mulch, jute matting, and similar materials.

AMM-2: Bank Stabilization

If bank stabilization activities, such as the placement of rock slope protection, are necessary, then such stabilization would contain bioengineering or design elements suitable for supporting riparian vegetation (See Appendix E), and would be constructed to minimize erosion downstream potential. The use of gabions for streambank stabilization is prohibited in this program. In areas that support juvenile salmonid rearing, bank stabilization projects would incorporate habitat enhancement features such as wood, boulders, and vegetation for habitat complexity to the extent feasible. Depending on the project site, the following streambank stabilization and habitat enhancement features may be used individually or in combination:

a. Alluvium placement –Using imported gravel-, cobble-, and boulder-sized material of the same composition and size as that in the channel bed and banks, to halt or attenuate streambank erosion, and stabilize riffles. This method is predominantly for use in small to moderately sized channels and is not appropriate for application in mainstem systems. Alluvium placement provides roughness, redirect flow, and provide stability to adjacent streambed and banks or downstream reaches, while improving fish habitat.

    1. When filling scour holes or constructing footings, facing or other protection using rock to prevent scouring or other erosive action, the amount of rock used would be limited to the minimum necessary to protect the integrity of the structure. Whenever feasible, include soil and woody vegetation as a covering and throughout the structure.

    2. Material used to construct the toe should be placed in a manner that mimics attached longitudinal bars or point bars. Size distribution of toe material would be diverse and predominately comprised of D_{84} to D_{max} size class material.

    3. Spawning gravels would constitute at least one-third of the total alluvial material used in the design, would be placed at or below an elevation consistent with the water surface elevation of a bankfull event, and can be used to fill the voids within toe and bank material and placed directly onto stream banks in a manner that mimics natural debris flows and erosion.

    4. All material would be clean alluvium with similar angularity as the natural bed material. When possible use material of the same lithology as found in the watershed. Reference *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings* (USDA-Forest Service 2008) to determine gravel sizes appropriate for the stream. Crushed rock is not permitted.

    5. Material can be mined from the floodplain at elevations above bankfull, but not in a manner that would cause stranding during future flood events.

    6. Material would not be placed directly on bars and riffles that are known spawning areas, which may cause fish to spawn on the unsorted and unstable gravel, thus potentially resulting in redd destruction.

    7. Imported material would be free of invasive species and non-native seeds. If necessary, wash prior to placement.

b. Large wood placement – Structures composed of large wood that do not use mechanical methods as the means of providing structure stability (i.e., large rock, rebar, rope, or cable). The use of native soil, alluvium with similar angularity as the natural bed material, or buttressing with adjacent trees as methods for providing structure stability may be utilized. This method is predominantly for use in small to moderately sized channels and is not appropriate for application in mainstem systems. These structures are designed to provide roughness, redirect flow, and provide stability to adjacent streambed and banks or downstream reaches, while providing valuable fish habitat.

1. Structure shall simulate natural disturbance events to the greatest degree possible and include, but not be limited to, log jams, debris flows, wind-throw, and tree breakage;

2. Structures may partially or completely span stream channels or be positioned along stream banks.

3. Where structures partially or completely span the stream channel, large wood should be comprised of whole conifer and hardwood trees, logs, and rootwads. Large wood size (diameter and length) should account for bankfull width and stream discharge rates.

4. Structures would incorporate a diverse size (diameter and length) distribution of rootwad or non-rootwad, trimmed or untrimmed, whole trees, logs, snags, slash, etc.

5. For individual logs that are completely exposed, or embedded less than half their length, logs with rootwads should be a minimum of 1.5 times bankfull channel width, while logs without rootwads should be a minimum of 2.0 times bankfull width.

6. Key pieces should be oriented such that the hydraulic forces upon the large wood increase stability.

c. Vegetated riprap with large wood – Combines resistive and continuous rock revetment techniques with vegetative techniques by installing a layer of stone and/or boulder armoring that incorporates vegetation and with large wood distributed throughout the structure (not just at toe). Large wood placed above the toe may be in the form of rootwad, whole trees, logs, snags, slash; whereas, large wood placed at the toe should be sturdy material, intact, hard, and undecayed and should be sized or embedded sufficiently to withstand the design flood. Space between root wads may be filled with large boulders, whole trees, logs, snags, slash, etc. Woody vegetation such pole planting, live staking and plantings should be planted in joints between the rocks.

   1. The minimum amount of wood incorporated into the treated area, for mitigation of riprap, is equal to the number of whole trees whose cumulative summation of rootwad diameters is equal to 80% of linear-feet of treated streambank or 20% of the treated area (square feet) of streambank, whichever is greater.

   2. Where whole trees are not used (i.e., snags, logs, and partial trees) designers are required to estimate the dimensions of parent material based on rootwad diameter, and calculating a cumulative equivalency of whole trees.

d. Roughened rock toe – Structural features that prevent erosion at the toe of a streambank, which is the location where erosional forces are greatest. They provide rock armoring at the most vulnerable point of the streambank while still allowing more natural techniques such as planting to be used on the upper streambank. Large woody debris can be incorporated into this technique to improve habitat value and further decrease water velocities adjacent to the bank. Similar to riprap, roughened rock toe would reduce sediment recruitment from the streambank, protect vegetation from erosion, and provide large woody debris recruitment.

1. Since larger rock is assumed to have greater habitat value and energy dissipation, rock toes should include rock along the toe line that is larger than that which is required to resist erosion alone. Similarly, large rock should be used when large woody debris is incorporated into the design to help secure the debris.

2. The rock toe should be installed at least to an elevation that corresponds with the lower limit of vegetation on a streambank or the ordinary high-water mark. Although on high-shear-stress banks, the top of the rock may have to be located higher on the bank than in streams with lower flood depth and lower slope.

3. Large woody debris placed into rock toes should be designed to withstand buoyancy and rotational forces. The debris must be well anchored into the rock to eliminate the risk of the buoyancy or leverage causing the debris to pull free and impact the integrity of the toe. Large woody debris installed in rock toes should be positioned such that it provides cover and has the potential to collect additional debris and bed material.

4. Natural hard points, such as large, stable trees or rock outcroppings, are natural places to begin or end the toe. Begin and end toe protection outside the area of bank erosion. An anchor point (a rock- or log-filled trench placed perpendicular to the toe and cut back into the bank) must be located at the upstream and/or downstream ends of the project to prevent flow from eroding behind the toe. Should the biotechnical bank protection above the toe fail, the anchor points guide the flow out from behind the toe and back into the channel. Without these trenches, the river could easily scour behind the toe along its length and cause bank failure.

e. Woody plantings – Bank-stabilization technique that relies on planted trees and shrubs to stabilize eroding banks, provide habitat benefits and improve aesthetics. Commonly used woody plantings include live cuttings, especially those from willows, because of their ability to root well from locally collected, dormant cuttings and to colonize bare, alluvial deposits. Other woody plant materials, including containerized plants, bare-root stock and salvaged plants, are also commonly used. The following considerations should be used to determine the best option for each project:

1. Develop design criteria to identify specific requirements related to plant performance, including acceptable plant-establishment period, size of plants, growth characteristics and species diversity.

2. Conduct a site and/or reference site review to identify existing plant species, their abundance and distribution, the lower limit of perennial vegetation, the depth to groundwater, the types of soil, the availability of light, hydrology and geographic characteristics, and land use. If a reference site is used, it should preferably be in the same or nearby watershed with similar site conditions.

3. Identify and select plants with the highest likelihood of survival. Plant species native to the project area should be used, and using a broad variety of species would improve the

likelihood of project success. Plant materials can include live-rotted cuttings, bare-root stock, and container plants; if seeding streambanks, the seed should be placed under erosion-control fabric to reduce the chance of seeds washing away during flood flows.

4. Within each hydrology-based planting zone, determine planting density and layout for all plant materials; determine site-preparation requirements, timing of installation and the proper planting techniques; consider the need for maintenance such as irrigation, weed control, and the control of animal browsing.

5. Develop a post-project monitoring plan to track success/failure and to help determine maintenance activities needed to maintain healthy plant growth. Monitoring should be conducted monthly during the first full growing season after installation and can be reduced to a single, annual visit in subsequent years. In the first year after planting, it is easy to measure survival of all installed plants by a physical count; but, with increased density as vegetation fills in, it may be necessary to use cover rather than count of individual plantings as a measure of plant survival.

f. Herbaceous cover, in areas where the native vegetation does not include trees or shrubs – Upper-bank-stabilization technique that consists of planted or installed, non-woody vegetation, such as grass and grass-like wetland plants, rushes, sedges, ferns, legumes, forbs, and wildflowers designed to help prevent surficial erosion, minimize subsurface soil movement, provide wildlife habitat, and enhance aesthetics or visual appearance.

1. The same steps as outlined in the previous section (e. Woody plantings) should be followed for designing and planting herbaceous cover. Monitoring cover from the start may be more appropriate and maintenance may include mowing.

g. Bank reshaping and slope grading – Laying back or reshaping a streambank that is eroding or is susceptible to erosion without changing the location of the toe. This technique flattens or reduces the slope to stabilize the bank and is usually done in conjunction with other bank protection treatments including revegetation of an excavated bank and installation of toe protection and erosion-control fabric.

1. Designs associated with bank reshaping are site-dependent. On small creeks, or where infrastructure is not at risk, reshaped banks may be accomplished with relatively simple design and planning. In other instances, bank reshaping may require extensive analysis, design and preparation of complete plans and specifications.

2. A reshaped must transition well from adjacent treated or untreated banks so that the erosive forces of flowing water would not be concentrated on a specific area. During the design and construction phase, be sure to minimize the removal or root disturbance of existing riparian trees and shrubs since they play many important roles in stabilizing banks and providing fish habitat.

h. Coir logs – Biodegradable, manufactured, elongated cylindrical fiber rolls typically made of coconut husk fibers bound together with a coir or synthetic netting, and typically staked in a single row at the base of low (one- to three-foot-high) streambanks on small streams. Once in place, the bank behind the log can be reshaped to a stable configuration and planted with native riparian vegetation. In this configuration, the logs provide protection against hydraulic forces at the toe of the bank. Properly installed, coir logs help retain moisture and may also provide a good growth medium for riparian plants and are usually planted with herbaceous or woody vegetation.

1. Coir logs should be installed in a shallow trench that is excavated at the toe of the bank slope, and the bottom of the trench should be slightly lower than the stream bed level.

2. Place the logs in the trench such that the ends are butted firmly together. The logs should be laced together, end-to-end, with coir or synthetic rope to create a continuous length. The upstream and downstream ends of the continuous length of coir logs tend to be weak spots and should therefore be buried three to five feet laterally into the bank to protect against erosive forces.

3. When properly installed, the upper surface of the roll should be parallel to the water surface at or above the ordinary high-water line and within the zone of perennial vegetation. Cut-and-fill adjustments can be made as needed, using only hand tools wherever possible, to seat the roll so that it lies smoothly at the correct elevation.

4. Secure the coir log in the trench by driving stakes (2 x 2 x 36 inches) between the binding twine and the inner log material on either side of the log. Pairs of stakes (one stake on each side of the log) should be installed at intervals of 1 to 4 feet along the length of the log, depending upon anticipated hydraulic forces. The tops of the stakes should not extend above the top of the log. All stakes should have notches that prevent laced twine from sliding off the ends of stakes.

5. In areas that would experience wave or ice action, 16-gauge wire should be used to secure the log. To install the wire, notch the outside faces of each pair of stakes slightly below the top of the log and install the wire through the notch.

6. Once the logs are secured, soil should be backfilled on the bank side of the log, and the bank should be reshaped as necessary. Planned surface treatments and plantings should then be installed on the bank. Care should be taken to disturb as little soil as possible outside the work area and to avoid damaging any existing trees and shrubs on or near the bank.

7. Rooted herbaceous plantings should be installed into the top or sides of the coir log, or alternatively, live cuttings can be installed through the log into the underlying substrate if a means to mechanically pierce the logs is available.

i. Deformable soil reinforcement – Also called fabric-wrapped soil, soil burritos or soil pillows is a system of soil layers or lifts encapsulated or otherwise reinforced with a combination of natural or synthetic materials and vegetation. These lifts are frequently filled with fine-grained soils that would support the growth of vegetation and are most oriented along the face of a bank in a series of stepped terraces. When used with degradable fabrics, the fabric would provide one- to four-year erosion protection, giving installed vegetation the time it needs to become well established for long-term bank stabilization. In situations where increased fabric strength and longevity are needed, synthetic fabrics can be used to provide both short- and long-term structural integrity.

1. Individual soil lifts, typically 0.5 to 1.5 feet tall, can be placed in a series of lifts to create bank slopes ranging from as steep as 1:1 to flatter than 3:1, making them useful where slopes cannot be cut back. Lifts can be laid in horizontally or at a 10- to 15-degree backslope, and series of lifts can be fit to bank heights of a few feet to more than 30 feet.

2. Bank treatments longer than the width of the fabric are constructed by overlapping adjacent strips of fabric by a minimum of three feet. The upstream fabric ends of fabric rolls should overlap downstream fabric ends like roof shingles to prevent the edges from being pulled up during flood events. The bottom and top edges of fabric lifts should be buried (embedded) a minimum of three feet. Fabric can be tensioned and secured using 18- to 24-inch-long, wedge-shaped wooden stakes, placed on 3-foot centers along the upper edge and sides of a fabric wrapped lift.

3. Upstream and downstream ends of a treatment must be well-transitioned into nontreated banks and may consist of treatment ends that are keyed into the bank, covered with soil-filled riprap, or fabricated into carefully folded fabric corners.

4. A wide variety of plant materials can be used to ensure that vegetation successfully reinforces the soil lifts by the time any degradable fabric weakens. Typically, native grass seed is used because it is easily and inexpensively installed during construction and can provide both short and long-term bank reinforcement. It is also recommended cuttings of native willows or species be placed horizontally and/or vertically between lifts during construction.

5. As with any revegetation effort, plant-species selection should be based on the site hydrologic regime, soil type, and rooting and establishment patterns; and the planting should occur at the appropriate time of year.

j. Engineered log jam (ELJ) – Collection of large woody debris that redirect flow and provide stability to a streambank or downstream gravel bar. Engineered-log-jam constructions are patterned after stable, natural log jams and can be either unanchored or anchored in place using man-made materials. They are suitable for use in mainstem systems and when properly designed and located, log jams can be very stable with life expectancies equal to or greater than the design life of traditional bank protection methods.

1. The design of an engineered log jam requires a thorough analysis of channel hydraulics, which should be conducted by a qualified engineer. In naturally formed jams, the most stable configuration is one where key members are oriented parallel to the high flow, with their rootwads upstream. Racked wood is generally positioned perpendicular to the flow direction.

2. Designing an unanchored, engineered log jam requires excavating the streambed to provide a trench for the key member(s). Once a key member is placed in a trench, the trench is covered with excavated sediment to provide additional ballast and frictional resistance to drag forces. Large woody material (whole trees with rootwads attached) are

stacked (stacked members) on the key members for ballast. Next, whole trees, logs and/or rootwads are racked on the upstream side of the key-piece rootwad(s).

3. For anchored log jams in small-grained substrate, log pilings can be driven vertically into the streambed using the excavator bucket. In larger substrate, pile-driving equipment may be required, as well as steel tips on the logs. The logs need to be long enough to extend below estimated scour depths. A second row of pilings should be driven into the streambed at least 20 feet downstream, and brace logs should be anchored between them. Large woody debris is then racked against the upstream side.

4. Construction should be conducted during a period where impacts to critical resident and anadromous fish life stages, such as spawning or migration, are avoided and when dewatering for construction is possible. Low-flow conditions are ideal for the placement of engineered log jams and may be essential for dewatering efforts. Dewatering eases installation and prevents siltation of the stream during construction.

k. Floodplain flow spreaders – Trees, large woody debris, or rock immobile rock placed in a series of rows perpendicular to the direction of overland flow to form small dams that are porous and collect debris and that dissipate flow energy and distribute the flow across the floodplain. This technique is suitable for use in mainstem systems.

1. The critical design parameter of a floodplain flow spreader is the base elevation of the structure and depth of flow on the floodplain at the flood event of interest; so the top of the spreader should be at or near the flood-event elevation, with allowances for increased stage due to backwatering caused by the spreader itself.

2. To ensure even distribution of water across the width of the floodplain, the elevation of the top of the spreader must be uniform across its length (cross valley direction).

3. The width (down-valley dimension) of the structure should be equal to (at a minimum) the depth of installation (predicted scour). If scour depth cannot be predicted, the width of the structure should be twice the diameter of the largest rock gradation.

4. Flow spreaders should be tied in to higher ground to prevent water from flowing around the spreader and scouring at the margins of the spreader.

5. Flow spreaders can be constructed from live trees, rock, soil, wood or other hard material. Alternatives include vegetated soil berms, wooden sills, or piles of large woody debris. Soil berms would require erosion protection in the form of fabric to hold soils in place while vegetation becomes established.

6. While the spreader may be constructed of rock, it would be difficult to achieve uniform elevation across its length with larger rock. Rock must not be so small that it is subject to entrainment due to tractive forces at the design flood event. Rock should be placed in a stable configuration and keyed in below the floodplain surface to the depth of potential scour. Graded rock would allow interlocking of individual stones and should be sized such that the D50 is immobile at design flows

l. Floodplain roughness – Preventative technique used to decrease overbank flow velocity and related shear stress by placing large woody debris and or vegetative roughness elements in the floodplain perpendicular to the predicted overbank flow direction at the locations where an avulsion or cutoff is likely to form. A combination of riparian plantings, live brush rows, and large woody debris can be used individually or in combination. Suitable for mainstem systems.

   1. Native riparian plantings are densely planted in a random pattern on the floodplain, and it is recommended that various configurations of live cuttings be oriented into multiple rows (live brush rows).

   2. Multistemmed shrubs are preferable over single stemmed trees, since they tend to disperse flood flows and encourage sediment deposition. The use of live cuttings is preferable over container or bare-root plants since they can be planted deep enough to reach the water table and are less prone to washout during flood flows.

   3. Large woody debris may need to be anchored to the floodplain if high shear stresses are anticipated during design flood flows. Large woody debris with intact branches is preferable, since the branches provide greater roughness than a bare tree trunk does. If this is not available, an alternative is to cable multiple bare logs together into a matrix configuration to simulate a tree with intact branches.

For more information on the above methods see FEMA (FEMA 2009) Engineering with Nature, Natural Resources Conservation Service (NRCS 2016) Natural Channel and Floodplain Restoration, Applied Fluvial Geomorphology (NRCS Website), or Integrated Streambank Protection Guidelines (Cramer *et al.* 2003). Other than those methods relying solely upon woody and herbaceous plantings, streambank stabilization projects must be designed by a qualified engineer that is appropriately registered in California.

AMM-3: Dust Control Measures

To reduce dust, all traffic associated with the recipient's (subapplicant) construction activities would be restricted to a speed limit of 20 miles per hour when traveling off of highways or county roads.

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

During construction, water or other binding materials would be applied to disturbed ground that may become windborne. If binding agents are used, all manufacturer's recommendations for use would be followed, and the following restrictions would be utilized:

a. Do not use petroleum-based products.

b. Do not apply dust-abatement chemicals, e.g., magnesium chloride, calcium chloride salts, ligninsulfonate, within 25 feet of a water body, or in other areas where they may runoff into a wetland or water body.

c. Do not apply ligninsulfonate at rates exceeding 0.5 gallons per square yard of road surface, assuming a 50:50 solution of ligninsulfonate to water.

AMM-4: Spill Control Planning

A Spill Prevention and Pollution Control Plan would be prepared to address the storage of hazardous materials and emergency cleanup of any hazardous material and would be available onsite. The plan would incorporate hazardous waste, stormwater, and other emergency planning requirements.

AMM-5: Spill Prevention and Pollution Control Measures

The recipient (subapplicant) would exercise every reasonable precaution to protect listed 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 would be treated by filtration, retention in a settling pond, or similar measures. Fresh cement or concrete would not be allowed to enter the flowing water of streams and curing concrete would not come into direct contact with waters supporting listed species. Construction pollutants would 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 would not be used.

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

If drilling or boring are used in a wetted channel or open water, the drilling operations would be isolated using a steel casing or other appropriate isolation method to prevent drilling fluids from contacting water. All drilling fluids and waste would be recovered and recycled or disposed of to prevent entry into flowing water.

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

The recipient (subapplicant) would 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 would be encircled by a berm to prevent the discharge of pollutants to groundwater or runoff into the habitats of listed species.

A spill containment kit with instructions and adequate materials for spill cleanup and disposal, adequate for the types and quantity of hazardous materials, would be maintained onsite. Workers would be trained on the location of the kits and in spill containment procedures.

AMM-6: Equipment Inspection, Cleaning, and Maintenance

Before entering wetlands or working within 150 feet of a water body, all heavy equipment, vehicles and power tools, would be power washed, allowed to fully dry, and inspected for fluid leaks. After cleaning, the equipment would be inspected to make certain no plants, soil, or other organic material are adhering to the surface.

Cleaning would be repeated as often as necessary during operation to keep all equipment, vehicles, and power tools free of external fluids and grease, and to prevent a leak or spill from entering the water.

Well-maintained equipment would be used to perform the work and, except in the case of a failure or breakdown, equipment maintenance would be performed offsite. Equipment would be inspected daily by the operator for leaks or spills. If leaks or spills are encountered, the source of the leak would be identified, leaked material would be cleaned up, and the cleaning materials would be collected and properly disposed. Fueling of land and marine-based equipment would 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 would be fueled and serviced in a “safe” area (i.e., outside of sensitive habitats) in a manner that would not affect listed species, their habitats, or EFH. Spills, leaks, and other problems of a similar nature would be resolved immediately to prevent unnecessary effects on listed species and their habitats, and reported to NMFS within 48 hours.

AMM-7: Fueling Activities

Avoidance and minimization measures would be applied to protect listed species, their habitats, and EFH from pollution due to fuels, oils, lubricants, and other harmful materials. Vehicles and equipment that are used during project implementation would be fueled and serviced in a manner that would not affect listed species or their habitats. Machinery and equipment used during work would be serviced, fueled, and maintained on uplands to prevent contamination to surface waters. Fueling equipment and vehicles would occur more than 200 feet away from all aquatic resources. Exceptions to this distance requirement may be allowed for boats, large cranes, pile drivers, and drill rigs if they cannot be easily moved.

AMM-8: Equipment Staging

No staging of construction materials, equipment, tools, buildings, trailers, or restroom facilities would occur in a floodplain during flood season, even if staging is only temporary. Riparian trees and shrubs would not be removed for staging areas.

AMM-9: Materials Storage and Disposal

Stockpiled soils would be adequately covered to prevent sedimentation from runoff and wind. All hazardous materials would 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 would 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 would 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 would occur in a floodplain. No storage of construction materials or debris would occur in a floodplain during flood season (See AMM-8).

Natural materials that are displaced by construction and reserved for restoration (e.g., gravel, cobble, and boulders) may be stockpiled within the floodplain and covered to avoid runoff of sediment and natural materials due to precipitation.

AMM-10: Fire Prevention

With the exception of vegetation-clearing equipment, no vehicles or construction equipment would be operated in areas of tall, dry vegetation.

The recipient (subapplicant) would 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.

AMM-11: Waste Management

The work area would be kept free of loose trash, including small pieces of residual construction material, such as metal cuttings, broken glass, and hardware.

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

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

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 would be installed so moored vessels would not beach on the shoreline, anchor lines would not drag. Moored vessels and buoys would not be located within 25 feet of vegetated shallow waters. Temporary floating work platforms would not anchor or ground in fish spawning areas in freshwater or in eelgrass, kelp, or macro algae. To reduce the potential for introducing aquatic invasive species, vessels would use the State's Marine Invasive Species Program, as described in AMM-24 below. Drip pans and other spill control measures would be used so that oil or fuel from barge-mounted equipment is properly contained. A spill containment kit with instructions and adequate materials for spill cleanup and disposal would be kept onboard. Workers would be trained on the location of the kit and in spill containment procedures.

1.3.9.2 Work Areas

AMM-13: Work Area Designation to Minimize Disturbance

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

Project planning must account for accordance with the AMMs and 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.

Before any significant ground disturbance or entry of mechanized equipment or vehicles into the construction area, clearly mark with flagging or survey marking paint the following areas:

a. Sensitive areas, *i.e.*, wetlands, water bodies, or spawning areas, as flagged and identified by a qualified biologist.

b. Equipment entry and exit points.

c. Road and stream crossing alignments.

d. Staging, storage, and stockpile areas.

AMM-14: Access Routes and Staging Areas

When working on stream banks or floodplains, disturbance to existing grades and vegetation would be limited to the actual site of the project and necessary access routes. Placement of all roads, staging areas, and other facilities would avoid and limit disturbance to stream bank or stream channel habitat as much as possible. When possible, existing ingress or egress points would be used and/or work performed from the top of the stream banks. After construction is complete, obliteration of all staging, storage, or stockpile areas, stabilization of the soil, and revegetatation of the area would occur.[6]

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[6] Road and path obliteration refers to the most comprehensive degree of decommissioning and involves decompacting the surface, pulling the fill material onto the running surface, and reshaping to match the original contour. In some cases tillage will be necessary to decompact soils and restore infiltration ability and soil productivity. A variety of implements/methods are available to decompact soils, including: winged subsoilers, rock ripper, excavators with brush rakes, mulching heads, or custom attachments such as the subsoiling grapple rake and subsoiling excavating bucket (e.g. Ripping soils with an excavator bucket

If temporary stream crossings are needed, they would be placed outside of potential spawning habitat for listed species. Temporary bridges/plates would be extended across the channel or mats would be placed on the stream bottom to minimize disturbance. When possible, vehicles and machinery would cross streams at right angles to the main channel. After completion of the work, the temporary crossings would be removed and the contours of the streambed, vegetation, and stream flows would 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, would 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 would 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. Any road on a slope steeper than 30% would be designed by a civil engineer with experience in steep road design.

1.3.9.3 Qualified Personnel, Construction Monitoring, and Fish Relocation

AMM-15: Environmental Awareness Training for Construction Personnel

All construction personnel would be given environmental awareness training by the project's environmental inspector or biological monitor before the start of construction. The training would familiarize all construction personnel with the listed species that may occur onsite, their habitats, general provisions and protections afforded by the ESA and MSA, measures to be implemented to protect these species, and the project boundaries. This training would be provided within 3 days of the arrival of any new worker.

AMM-16: Biological Monitor

If a project involves dewatering activities, fish relocation, and/or any potential take (e.g., injury, mortality, harassment) of listed fish species, a qualified Biological Monitor would be present onsite for all construction activities that occur within 100 feet of habitats for those species. The Biological Monitor would ensure that all applicable avoidance and minimization measures in the BO are implemented during project construction. The Biological Monitor would 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 Biological Monitor would 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 Biological Monitor would have the authority to stop any work activities that could result in unauthorized adverse effects to listed species and/or their habitats. The Biological Monitor may

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mounted with teeth). The depth of needed tillage can be estimated by referring to the rooting depth of nearby native vegetation. In areas of dispersed soil disturbance consider spot tillage.

also conduct environmental awareness training to construction personnel prior to the start of construction.

AMM-17: Fish Relocation

If the proposed project requires in-channel work and/or channel diversion, and FEMA has determined that listed fish species have potential to occur during the construction period, fish collection and relocation would be performed.

Fish relocation would only be conducted by a qualified Fisheries Biologist and their assistants as needed. The Fisheries Biologist would have knowledge and experience in listed fish species biology and ecology, fish/habitat relationships, biological monitoring, and handling, collecting, and relocating listed fish species or other relevant experience. The biologist would relocate any stranded fish to an appropriate place depending upon the life stage of the fish and flow conditions in the vicinity. The biologist would note the number of individuals observed in the affected area, the number of individuals relocated, the approximate size of individuals, any injuries or mortalities of fish, and the date and time of the collection and relocation. This information would be reported to FEMA and NMFS. One or more of the following methods would be used to capture listed fish: electrofishing, dip net, seine, throw net, minnow trap, and hand.

For projects that require fish rescue and relocation, the recipient (subapplicant) would develop a fish relocation plan, and FEMA would submit it to NMFS for approval, and copy the Governor's Office of Emergency Services (Cal OES) on the submittal of this plan. This plan would incorporate the latest NMFS guidance relating to the electrofishing and relocation of fish[7], such as:

a. If practicable, allow listed fish species to migrate out of the work area or remove fish before dewatering; otherwise remove fish from an exclusion area as it is slowly dewatered with methods such as hand or dip-nets, seining, or trapping with minnow traps (or gee-minnow traps).

b. Fish capture will be supervised by a qualified Fisheries Biologist, with experience in work area isolation, collection of salmonids, and competent to ensure the safe handling of all fish.

c. Conduct fish capture activities during periods of the day with the coolest air and water temperatures possible, normally early in the morning to minimize stress and injury of species present.

d. Monitor the nets frequently enough to ensure they stay secured to the banks and free of organic accumulation.

[7] At the time of publication, the most recent guidance reference is "National Marine Fisheries Service. 2000. Guidelines for electrofishing waters containing salmonids listed under the Endangered Species Act. Portland, Oregon and Santa Rosa, California."

e. Electrofishing will be used during the coolest time of day, only after other means of fish capture are determined to be not feasible or ineffective.

   1. Do not electrofish when the water appears turbid, *e.g.*, when objects are not visible at depth of 12 inches.

   2. Do not intentionally contact fish with the anode.

   3. Follow NMFS (2000) electrofishing guidelines, including use of only direct current (DC) or pulsed direct current within the following ranges:

      i. If conductivity is less than 100 microsecond (µs), use 900 to 1100 volts.

      ii. If conductivity is between 100 and 300 µs, use 500 to 800 volts.

      iii. If conductivity greater than 300 µs, use less than 400 volts.

   4. Begin electrofishing with a minimum pulse width and recommended voltage, then gradually increase to the point where fish are immobilized.

   5. Immediately discontinue electrofishing if fish are killed or injured, *i.e.*, dark bands visible on the body, spinal deformations, significant de-scaling, torpid or inability to maintain upright attitude after sufficient recovery time. Recheck machine settings, water temperature and conductivity, and adjust or postpone procedures as necessary to reduce injuries.

f. If buckets are used to transport fish:

   1. Minimize the time fish are in a transport bucket.

   2. Keep buckets in shaded areas or, if no shade is available, covered by a canopy.

   3. Limit the number of fish within a bucket; fish will be of relatively comparable size to minimize predation.

   4. Use aerators or replace the water in the buckets at least every 15 minutes with cold clear water.

   5. Release fish in an area upstream with adequate cover and flow refuge; downstream is acceptable provided the release site is below the influence of construction.

   6. Be careful to avoid mortality counting errors.

Monitor and record fish presence, handling, and injury during all phases of fish capture and submit a fish salvage report to FEMA and the FEMA Programmatic emailbox (fema.programmaticbiop@noaa.gov) within 60 days.

AMM-18: Pre-construction Surveys and Relocation of Black Abalone

For projects that require in-water work in areas supporting black abalone, pre-construction surveys for the species would be conducted if there is potential for the construction to result in injury or mortality of the species. The survey would be conducted by a qualified Biologist who has experience in visually identifying black abalone in the field and characterizing habitat parameters important for black abalone persistence no more than 30 days preceding the onset of in-water construction. The results of the preconstruction survey would be documented in a report prepared by the Biologist and submitted to NMFS for approval, and Cal OES would be copied on the submittal.

Black abalone encountered during pre-construction surveys would be reported to NMFS. If NMFS so directs, isolated black abalone (>2 meters [6.6 feet] apart from another black abalone) encountered during the pre-construction survey would be relocated to a pre-determined, NMFS-selected intertidal area containing suitable habitat. The relocation area would be as close as possible to the collection site to minimize handling time. Black abalone relocation would be performed by a qualified Biologist and would adhere to the handling protocol described for white abalone in the White Abalone Broodstock Collection and Holding Protocol (NMFS 2008b). Should a group (two or more black abalone within 2 meters [6.6 feet] of one another) of black abalone be encountered within 12.2 meters (40 feet) of the project footprint, repositioning the project footprint to avoid black abalone would be considered. If repositioning the project footprint is not feasible and if NMFS so directs, groups of black abalone may be relocated to a pre-determined, NMFS-selected intertidal area following the handling protocol described for white abalone.

1.3.9.4 Work Activities

AMM-19: Timing of In-Stream Work

All in-water construction would be planned to occur during the in-water work seasons identified in Appendix C. If any anadromous fish are expected to be present in the project footprint, work would not proceed until avoidance and/or relocation measures have been established in coordination with NMFS. All non-emergency activities capable of advanced notice would be scheduled during the work windows and during dry or low-flow periods.

AMM-20: Daily Work Hours

In-channel construction activities that could affect suitable habitat for listed fish species or EFH would be limited to daylight hours during weekdays, leaving a nighttime and weekend period of passage for the species. Work would be allowed on weekends if the proposed construction is 14 days or less in length.

AMM-21: Bridge and Culvert Design

All new or replacement bridges and culverts on anadromous-fish-bearing streams would be designed in accordance with the most current NMFS fish passage guidelines. All new stream crossings in EFH or habitat for covered anadromous fish must be able to allow passage of adult and juvenile life stages of the species. All culvert stream crossings, regardless of the design option used, would be designed to allow passage of the 1-percent-annual-chance flood discharge without structural damage to the crossing. The analysis of the structural integrity of the crossing would take into consideration the debris loading likely to be encountered during flooding. Stream crossings or culverts located in areas where there is significant risk of inlet plugging by flood-borne debris would be designed to pass the 1-percent-annual-chance flood without exceeding the top of the culvert inlet (headwater-to-diameter ratio less than 1). This is to ensure a low risk of channel degradation, stream diversion, and failure over the life span of the crossing. Hydraulic capacity of culverts must account for expected deposition of sediments in the culvert bottom. The design would also consider climate change projections including flow magnitude and duration, and sea level rise for the life of the structure. The recipient's (subapplicant) bridge or culvert design would be submitted by FEMA along with the ESA/MSA Review Form for approval by NMFS.

1.3.9.5 Habitat Protection

AMM-22: Water Quality Protection

Contractors would exercise every reasonable precaution to protect listed species, their critical habitat, and EFH from construction byproducts and pollutants, such as construction chemicals, fresh cement, saw-water, or other deleterious materials in accordance with federal, state, and local permitting. Fresh cement or uncured concrete would not be allowed to come into contact with any waterway. Construction waste would be collected and transported to an authorized upland disposal area, as appropriate, and per Federal, State, and local laws and regulations. The recipient (subapplicant) would follow the best management practices described in *The Use of Treated Wood Products in Aquatic Environments* guidelines (NMFS 2009). Of chief concern in this guidance are the effects of the contaminants on Pacific salmonids, many of which are managed under the ESA, and the EFH provisions of the MSA. This guidance would be used in conjunction with site-specific evaluations of other potential impacts. Riprap would be clean and durable, free from dirt, sand, clay and rock fines and would be installed to withstand the 100-year flood event. If applicable, appropriate measures would be taken to minimize disturbance to potentially contaminated sediments.

AMM-23: Large Woody Material Placement

Projects in rivers may include the use of large woody material (LWM) as part of hazard mitigation, erosion control, or floodproofing. Stockpiling of LWM for later placement at stream or river projects is acceptable. LWM would be picked up and placed into the waterbody and positioned so it does not interfere with watercraft maneuvering. Anchoring techniques would be used as needed to prevent the LWM from moving during high-flow events. FEMA would be responsible for ensuring the subapplicant follow the agency guidelines on bioengineering techniques (Appendix E), as applicable.

AMM-24: Revegetation of Steam Banks

For projects that require revegetation of stream and river banks as a result of woody riparian vegetation removal during construction activities The FEMA would require the subapplicant to prepare and implement a revegetation plan that includes information regarding monitoring for success. Revegetation plantings would be replaced at a 3:1 ratio with an 80% planting survival within 5 years of the plantings. Planting or seeding would occur before or at the beginning of the first growing season after construction and include species native to the area or region. When feasible, the native vegetation would be cut off at ground level instead of grubbed, so it can potentially grow back and establish on its own, and/or the cut or grubbed vegetation would be salvaged, protected, and replanted.

Additional revegetation requirements are specified in as follows:

a. Plant and seed disturbed areas before or at the beginning of the first growing season after construction.

b. Use a diverse assemblage of vegetation species native to the action area or region, including trees, shrubs, and herbaceous species. Vegetation, such as willow, sedge and rush mats, may be gathered from abandoned floodplains, or stream channels. When feasible, use vegetation salvaged from local areas scheduled for clearing due to development.

c. For long-term revegetation use only species native to the project area or region that will achieve shade and erosion control objectives, including forb, grass, shrub, or tree species that are appropriate for the site.

d. Short-term stabilization measures may include use of non-native sterile seed mix if native seeds are not available, weed-free certified straw, jute matting, and similar methods.

e. Do not apply surface fertilizer within 50 feet of any wetland or water body.

f. Install fencing as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

g. Do not use invasive or non-native species for site restoration.

Conduct post-construction monitoring and treatment to remove or control invasive plants until native plant species are well-established.

AMM-25: Invasive Plants and Aquatic Species

FEMA would ensure the subapplicant follows guidelines California Invasive Plant Council's Preventing the Spread of Invasive Plants: Best Management Practices for Land Managers (Cal-IPC 2012) to prevent the spread of invasive plant species. Construction equipment would be clean of material that may harbor invasive plant seeds or invasive pests before entering the work area. This material includes dirt or plant seeds on construction equipment, tools, boots, and clothing.

Construction equipment operating in aquatic habitat in the creeks would be closely inspected before entering the creek channel to prevent the spread of invasive aquatic species and must be completely clean and dry. Guidelines, such as those in the Guide to Preventing Aquatic Invasive Species Transport by Wildland Fire Operations (NWCG 2017), describe power washing and decontamination methods, and would be followed. The subapplicant would 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).

AMM-26: Work below Mean Higher High Water

In tidally influenced estuarine and marine areas that are designated as EFH and/or may support listed species, disturbance to habitat below mean higher high water would be limited to the maximum extent possible.

AMM-27: Avoidance of Submerged Vegetation

The removal of submerged vegetation (such as eelgrass and kelp) would be avoided to the maximum extent possible. Impacts to eelgrass would require mitigation as specified in NMFS' California Eelgrass Mitigation Policy and Implementing Guidelines (NMFS 2014).

AMM-28: Minimization of Shading by Overwater Structures

To reduce shading effects, new and replacement structures placed over estuarine and marine waters (such as piers, floating docks, and gangways) would incorporate design elements (such as increased height, metal grating or glass paver blocks) that allow better light transmission consistent with the programmatic EFH consultation for overwater structures in San Francisco Bay (NMFS 2011).

1.3.9.6 Fish Species Protection

AMM-29: Fish Screening Criteria

If pumping is necessary for channel diversion, the pump intakes would be provisioned with NMFS-approved fish screening as outlined in California Department of Fish and Wildlife (CDFW) *Fish Screening Criteria* (CDFW 2001) and NMFS *Fish Screening Criteria for Anadromous Salmonids* (NMFS 1997, Appendix D). For projects in the Delta or in areas where Delta smelt may occur, the design approach velocity would be 0.2 feet per second and channel diversion would be coordinated with the USFWS because the Delta smelt is under the USFWS jurisdiction. FEMA or recipient (subapplicant) will submit fish screen designs along with the ESA/MSA Review Form for approval by NMFS.

AMM-30: Temporary Water Diversion and Dewatering

Construction activities conducted within wetted channels whenever ESA-listed fish are reasonably certain to be present will isolate work areas through dewatering, unless NMFS and FEMA agree during project review that the dewatering would result in greater impact than conducting in-water work.

In-water work and channel diversion of live flow during project construction would be conducted in a manner to reduce potential impacts to rearing and migrating fish. Dewatering would be used to create a dry work area and would be conducted in a manner that minimizes turbidity into nearby waters. Water diversion and dewatering would include the following measures:

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

b. If listed fish may be present in the areas to be dewatered, a NMFS-approved fish rescue would be conducted by a qualified Fisheries Biologist in accordance with AMM-17: Fish Relocation.

c. Suspended sediment in water pumped or removed from dewatered areas would be filtered or allowed to settle before its release, or allowed to filter through vegetated upland areas prior to re-entering the stream channel so that it does not contribute turbidity to nearby waters.

d. Where gravity feed is not possible, a pump may be used to sustain stream flow. Pump intakes in any fish bearing waters would be appropriately screened to avoid fish entrainment as described in AMM-30.

e. Temporary culverts to convey live flow during construction activities would be placed at stream grade and be adequately sized to not increase stream velocity.

f. Silt fences or mechanisms to avoid sediment input to the flowing channel would be erected adjacent to flowing water if sediment input to the stream may occur.

g. When construction is complete, the construction site would be re-watered slowly to prevent loss of surface flow downstream, and to prevent a sudden increase in stream turbidity.

AMM-31: Pile Driving Methods

FEMA would ensure the following measures would be implemented by the recipient (subapplicant) to reduce the effects of underwater noise during pile driving when it is conducted in locations potentially supporting listed species:[8]

a. Piles may be concrete, or steel round pile 24 inches in diameter or smaller, steel H-pile designated as HP24 or smaller, or wood. If the wood has been treated, it must be sealed with an inert coating as described below:

    1. Pile wrappings may be used to wrap new inorganic arsenical treated wood piles (chromated copper arsenate and ammonia copper-zinc arsenate) in aquatic environments. Pile wraps cannot be used for new creosote, creosote solutions, or oil-borne preservatives under this biological opinion.

    2. Wraps can be pre-formed plastic such as polyvinyl chloride (PVC), fiber glass-reinforced plastic, or a high density polyethylene (HDPE) with an epoxy fill, petrolatum saturated tape (PST), or an inner wrap in the void between the wrapping and the pile.

[8] Any project activity that would harm or harass marine mammals also requires an Incidental Harassment Authorization from NMFS, independent of the PBA-PBO.

i. Exterior pilings, pilings that will come into direct contact with ocean and barge vessels, may only use high density polyethylene pile wrappings, steel-reinforced concrete, or steel-cased pilings.

ii. The material used for interior pilings must be durable enough to maintain the integrity for at least 10-years and a minimum of 1/10 of an inch thick with all joints sealed to prevent leakage.

iii. Sealing or capping the tops of the pilings shall prevent treated wood surface exposure within the water column and prevent dripping.

3. Pile wrappings will extend above and below the portion of the piling in contact with the water. The wrapping shall extend down into the substrate at least 18 inches below the mudline to contain treatment chemicals. The wrapping may extend to either the top of the piling or to a minimum height above the ordinary high water mark for riverine systems or the HAT line for marine systems to protect the treated wood from water contact.

4. All operations to prepare pile wrappings for placement cutting, drilling, and placement of epoxy fill will occur in a staging area away from the waterbody.

5. Polyurea barrier systems may be used to coat new inorganic arsenical pressure-treated wood piles in aquatic environments. The coating must be an impact-resistant, biologically inert coating that lasts or is maintained for a specified amount of time (NMFS 2009a).

   i. The polyurea coating should be specified by the manufacturer for in-water use to avoid degradation of the coating and over water spills. Prefabrication will be used whenever possible to minimize cutting, drilling and field preservative treatment.

   ii. Polyurea products must be coated on dry piles, free of loose wood, splinters, or sawdust and mechanical damage.

   iii. Only products treated in accordance with the WWPI and best management practices will be accepted for coating.

   iv. The polyurea coating must be ultraviolet light resistant and a minimum of 250 mil thick in the area that is submerged (Morrell 2017)

6. All pile wrappings and coatings will require an inspection and maintenance program. The program is designed to identify potential failures within the pile barrier system as soon as possible after a breach occurs. It is recommended that the maintenance of wrapped piles be performed by an experienced and licensed marine contractor. All submerged portions of the wrapped pilings will be inspected every 1-2 years beginning 3-5 years after installation, particularly in active facilities where there is the potential for abrasion or boat collisions that can damage the barrier.

7. When to Repair. Small gaps or tears in the barrier will have little effect on potential migration of preservative. Damage to 25 % or more of the barrier surface on an individual pile should result in action to repair the surface by adding additional coating or

barrier material to mitigate any future preservative loss. Missing or damaged wraps should be replaced as soon as possible.

b. Pre-project analysis of underwater noise would be conducted for all pile driving. Pile driving analysis would follow the criteria outlined in the California Department of Transportation's *Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish* (Caltrans 2015) and would utilize the latest underwater noise criteria established by the Fisheries Hydroacoustic Working Group (FHWG 2008).

c. A vibratory driving hammer or other low-impact method would be used when feasible, because it produces lower sound energy in the water. Otherwise, refer to item b.

d. Construction projects that require the use of impact pile driving would require underwater noise monitoring and analysis during all phases of the pile driving to determine the intensity and extent of potential sound effects on listed species. Prior to the start of construction, an NMFS-approved sound monitoring plan would be developed. This plan would provide detail on the sound attenuation system and the methods used to monitor, verify, and report sound levels during pile driving activities. The sound monitoring results would be made available to NMFS.

e. When using an impact hammer to drive or proof a steel pile, one of the following sound attenuation methods would be used:

    1. Completely isolate the pile from flowing water by dewatering the area around the pile.

    2. If water velocity is 1.6 feet per second or less, surround the pile being driven by a confined or unconfined bubble curtain that would distribute small air bubbles around 100% of the pile perimeter for the full depth of the water column. See, *e.g.*, NMFS and USFWS (2006), Caltrans Technical Report No. CTHWANP-RT-306.01.01 (2015), Wursig *et al*. (2000), and Longmuir and Lively (2001).

    3. If water velocity is greater than 1.6 feet per second, surround the pile being driven with a confined bubble curtain (*e.g.*, surrounded by a fabric or non-metallic sleeve) that would distribute air bubbles around 100% of the pile perimeter for the full depth of the water column.

    4. Provide NMFS information regarding the timing of in-water work, the number of impact hammer strikes per pile and the estimated time required to drive piles, hours per day pile driving would occur, depth of water, and type of substrate, hydroacoustic assumptions, and the pile type, diameter, and spacing of the piles.

f. A "soft-start" technique would be used during pile extraction and driving to allow fish to vacate the area before the pile driver reaches full power. For vibratory hammers, the contractor would initiate the driving for 15 seconds at reduced energy followed by a 1-minute waiting period. This procedure would be repeated two additional times before continuous driving is started. For impact driving, an initial set of three strikes would be made by the hammer at 40% energy, followed by a 1-minute waiting period, then two subsequent three-strike sets before initiating continuous driving.

g. Piles would be pulled out in their entirety using a vibratory hammer, if feasible. If they break while being pulled or cannot be pulled out, they would be cut off at or below the mud or substrate level. Removed piles would be slowly lifted out of the sediment and water and placed in a containment basin made with durable plastic sheeting and sufficiently high walls to retain sediment and return flow.

1.3.10 Monitoring and Reporting Requirements

FEMA would be responsible for ensuring that all project monitoring and reporting required in the BO (e.g., revegetation monitoring, underwater noise monitoring, fish capture and relocation reporting) for the proposed project is completed by the recipient (subapplicant), along with any other monitoring or reporting as required by NMFS for the specific project. FEMA would be responsible for failures to complete such monitoring and reporting.

All project ESA/MSA Review Forms and reports are to be submitted electronically to NMFS at fema.programmaticbiop@noaa.gov. FEMA will send only **one** project per e-mail submittal, and will attach all related documents.

1.3.11 Annual Reporting Requirements

FEMA would prepare and submit an annual report to NMFS containing a summary of the numbers and types of projects implemented that were covered under the BO. This annual report would include a tabular summary of those projects. An accounting of take based on either a number of individuals or disturbance to suitable habitat as a surrogate would be provided in the annual report, which would include a tally of the total from all prior years. This summary also would include the project locations, recipient (subapplicant) names, and the federally listed species covered, among other project information.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and/or an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of" a listed species, which is "to engage in an action that 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). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the definition of "destruction or adverse modification," which "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" (50 CFR 402.02).

The designation(s) of critical habitat for species use(s) the term primary constituent element (PCE) or essential features. The 2016 critical habitat regulations (81 FR 7414) replace this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.

- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors by: (1) Reviewing the status of the species and critical habitat; and (2) adding the effects of the action, the environmental baseline, and cumulative effects to assess the risk that the proposed action poses to species and critical habitat.
- Reach a conclusion about whether species are jeopardized or critical habitat is adversely modified.
- If necessary, suggest a RPA to the proposed action.

The proposed action for this consultation is a mixed programmatic action as defined by 50 CFR 402.02. A mixed programmatic action approves actions that are reasonably certain to cause take, and which will not be subject to further section 7 consultation, and also approves a framework for the development of future actions that are authorized, funded, or carried out at a later time. Take of a listed species would not occur unless and until those future actions are authorized, funded, or carried out and subject to further section 7 consultation. This proposed action includes construction activities that are reasonably certain to cause take, and therefore will not be the subject of future individual consultations. We provide an incidental take exemption, associated reasonable and prudent measures, and terms and conditions for take resulting from these activities in the incidental take statement in this document. The reminder of the activities included in the proposed action will be addressed by individual or programmatic consultations if those actions may affect listed species or critical habitat. To complete our jeopardy and adverse modification analysis, we analyze effects of these activities considering how the action agency's proposed management objectives and direction influence the nature of those effects. We then consider the action agency's projected level of activity to predict, to the degree we can, the scale of any impact on listed species and critical habitat. For the activities that will be the subject of future consultations, we do not try to predict exactly what will happen at a particular action site in the future. Rather, our jeopardy and adverse modification analysis focuses on whether the management objectives and direction set sideboards that achieve an adequate level of conservation for listed species and critical habitat. We reserve the ability to conclude that any future site-specific action that appreciably reduces the likelihood of both the survival and recovery of a listed species would jeopardize the continued existence of listed species. Likewise, we reserve the ability to conclude that any future site-specific action that appreciably diminishes the value of critical habitat for the conservation of a listed species would adversely modify critical habitat. Any take we determine will not jeopardize the continued existence of listed species resulting from activities that will be the subject of future consultations will be exempted in future incidental take statements.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of risk that the listed species faces, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. The species status section helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential physical and biological features that help to form that conservation value.

Information and GIS layers is located at the NMFS Westcoast Fisheries Critical Habitat Webpage.

This BO covers 13 federally listed species (including their respective distinct population segments (DPSs) and evolutionarily significant units (ESUs)) under NMFS jurisdiction that have a high potential to occur within the Action Area, their critical habitat, and EFH in the Action Area. The federally listed species of fish potentially occurring in the action area under NMFS jurisdiction include:

North American green sturgeon (*Acipenser medirostris*, one DPS): Southern DPS.
Coho salmon (*Oncorhynchus kisutch*, two ESUs):
- Southern Oregon/Northern California Coast ESU, and
- Central California Coast ESU.

Steelhead (*Oncorhynchus mykiss*, five DPSs):
- Southern California DPS,
- South-Central California Coast DPS,
- Northern California DPS,
- Central Valley DPS, and
- Central California Coast DPS.

Chinook salmon (*Oncorhynchus tshawytscha*, three ESUs):
- California Coastal ESU,
- Central Valley Spring-run ESU, and
- Sacramento River Winter-run ESU.

Eulachon (*Thaleichthys pacificus*, one DPS): Southern DPS; and
Black abalone (*Haliotis cracherodii*).

The black abalone is the only federally listed invertebrate under NMFS jurisdiction with a high potential to occur in the Action Area. Table 2 provides the listing status and critical habitat designation for these listed species.

Table 2. Federally Listed ESU/DPS and Critical Habitat Covered under BO

Specie sand ESU/DPS	ESA Listing Status* (Federal Register Location)	ESA Critical Habitat* (Federal Register Location)
Green Sturgeon, Southern DPS	Threatened (71 FR 17757)	Oct 9, 2009 (74 FR 52300)
Coho Salmon, Southern Oregon/Northern California Coast ESU	Threatened (70 FR 37160)	May 5, 1999 (64 FR 24049)
Coho Salmon, Central California Coast ESU	Endangered (70 FR 37160)	May 5, 1999 (64 FR 24049)
Steelhead, Southern California DPS	Endangered (71 FR 834)	Sept 2, 2005 (70 FR 52488)
Steelhead, South-Central California Coast DPS	Threatened (71 FR 834)	Sept 2, 2005 (70 FR 52488)
Steelhead, Northern California DPS	Threatened (71 FR 834)	Sept 2, 2005 (70 FR 52488)
Steelhead, Central Valley DPS	Threatened (71 FR 834)	Sept 2, 2005 (70 FR 52488)
Steelhead, Central California Coast DPS	Threatened (71 FR 834)	Sept 2, 2005 (70 FR 52488)
Chinook Salmon, California Coastal ESU	Threatened (70 FR 37160)	Sept. 2, 2005 (70 FR 52488)
Chinook Salmon, Central Valley Spring-run ESU	Threatened (70 FR 37160)	Sept. 2, 2005 (70 FR 52488)
Chinook Salmon, Sacramento River Winter-run ESU	Endangered (70 FR 37160)	June 16, 1993 (58 FR 33212)
Euchalon, Southern DPS	Threatened (75 FR 13012)	Oct 20, 2011 (76 FR 65324)
Black Abalone	Endangered (74 FR 1937)	Oct. 27, 2011(76 FR 66806)

- DPS = Distinct Population Segment
- ESA = Endangered Species Act
- ESU = Evolutionary Significant Unit
- FR = Federal Register

* Date of final listing or designation, does not include subsequent updates or modifications posted to the FR.

2.2.1 Life History and Range

2.2.1.1 Coho Salmon

Coho salmon (*Oncorhynchus kisutch*) in North America presently range from Scott Creek, in California, to Point Hope, Kotzbue Sound Alaska (Sandercock 1991, Weitkamp *et al*. 1995). Coho salmon are distributed along the California coast from the Oregon border in the north to Monterey Bay in the south and are extirpated from the San Francisco/San Pablo Bay system, where they were historically present.

Coho salmon are semelparous salmonids, spending the first half of their life cycle rearing in streams and small freshwater tributaries. The remainder of the life cycle is spent foraging in estuarine and marine waters of the Pacific Ocean before returning to their stream of origin to spawn and die. Nearly all adult coho salmon returning to spawn in the coastal systems along the northern California coast system enter the estuary in December and January, spawn by mid-winter, and then die. Most spawning adults are three-years old; however, a small percentage (5–20 percent) of precocious males known as “jacks” return to spawn as two-year olds (Weitkamp *et al*. 1995). Eggs incubate in redds (gravel spawning nests) for 1-3 months, depending on the water temperature, before emerging as alevins (larval life stage that depends upon yolk sacs as its food source). Alevins emerge as fry from February to May and initially congregate in shaded backwaters, side channels, or small streams where the stream velocity is less.

Juvenile rearing usually occurs in tributary streams with a gradient of 3 percent or less, although they may move up to streams of 4 or 5 percent gradient. Juveniles occupy streams as small as 1 to 2 meters wide. They may spend 1 to 2 years rearing in freshwater (Bell and Duffy 2007), or emigrate to lower river and estuary habitat as age 0+ juveniles (Tschaplinski 1988, Koski 2009). Emigration of age 0+ coho salmon is not as common as emigration at age 1 or 2, but represents an important nomadic life history diversity strategy that adds resilience to populations(Koski 2009). Coho salmon juveniles are also known to redistribute into non-natal rearing streams, lakes, or ponds, often following rainstorms, where they continue to rear (Peterson 1982). As small as 38 to 45 mm long, fry may migrate upstream a considerable distance to reach lakes or other rearing areas (Sandercock 1991, Nickelson *et al*. 1992). Emigration from streams to the estuary and ocean generally takes place from March through May. Peak outmigration timing generally occurs in May, with some runs earlier or later, and with most smolts measuring 90-115 mm fork length.

As fry grow, they migrate to habitats with complex cover such as undercut banks, rootwads, large woody debris (LWD) and vegetative overhangs. Instream habitat complexity, including a mixture of pools and riffles, LWD, and well oxygenated cool water (10-15 degrees Celsius (°C)/50-59 degrees Fahrenheit (°F)) are important habitat components for coho salmon fry (Sandercock 1991, Moyle 2002b). The most productive coho salmon nursery habitats tend to be small streams having a larger ratio of slack water to midstream area (Sandercock 1991). Fry typically rear in freshwater for up to 15 months, migrating to the ocean in the spring as smolts. Coho salmon typically spend two growing seasons in the ocean before returning to their natal stream to spawn. In the estuary, smolts often linger for a period, moving up and down with tidal currents, suggesting that period of estuarine residence is preferred for adjusting their osmoregulatory system to seawater (Nielson 1994).

Survival and distribution of juvenile coho salmon have been associated with available winter habitat (Bustard and Narver 1975, Peterson 1982, Tschaplinski 1988, Nickelson *et al*. 1992, Quinn 1996). Both instream cover and off-channel habitats that provide slow water are essential to juvenile coho salmon for protection against displacement by high flows and as for cover from predation (Bustard and Narver 1975, Mason 1976, Solazzi *et al.* 2000). Juvenile coho appear to prefer deep (greater than 1.5 feet), slow water (less than 1 fps) habitats within or near cover of roots, large wood, or flooded brush (Bustard and Narver 1975), especially during freshets (Tschaplinski and Hartman 1983, Swales *et al.* 1986, and McMahon *et al.* 1989).

During the fall and spring, juvenile coho salmon often make seasonal or temporary shifts to off-channel areas that provide key winter habitat features when temperatures drop and base flows rise (Scarlett and Cederholm 1984, Bell *et al.* 2001). These off-channel habitats provide low velocity rearing areas, often with ample foraging opportunities (Bell *et al.* 2001). Overwintering coho salmon are often found in slower velocity habitats such as floodplains, sloughs, alcoves, backwaters, beaver ponds, and complex or deep in-channel habitats associated with large wood. Off-channel ponds are important winter rearing areas for juvenile coho salmon, and growth rates of juveniles in off-channel habitats were greater than those in the mainstem river segments (Morley *et al.* 2005, Swales and Levings 1989, Brown *et al*. 1988).

2.2.1.2 Chinook Salmon

Within oceanic waters, Chinook salmon range from the Gulf of Alaska and the Bearing Sea to Monterey Bay, with different ESUs frequenting different oceanic regions. Historically, Chinook salmon of California occurred in coastal drainages as far south as the Ventura River in Southern California and occupied the majority of the Sacramento and San Joaquin River watersheds up to natural impassable barriers, such as waterfalls (NMFS 2014a). The freshwater range of Chinook salmon has been greatly restricted by the placement of dams on waterways. The species is no longer present in coastal waterways south of the Russian River. Estuaries, such as San Francisco Bay and Humboldt Bay, provide rearing habitat for outmigrating juveniles (Moyle 2002b).

Healey (1991) describes two basic life history strategies (races) for Chinook salmon, stream-type and ocean-type, although there is variation within each life history strategy. Like most salmonids, Chinook salmon have evolved variation in juvenile and adult behavior patterns which can help decrease the risk of catastrophically high mortality in a particular year or habitat (Healey 1991). Spring-run Chinook salmon are often stream-type (Healey 1991, Moyle 2002b). Several independent populations reproduce in California waterways, separated either geographically or by timing of migration and spawning. Fall-run Chinook salmon migrate upstream to spawning grounds from July through April and spawn October through February. Winter-run Chinook enter the rivers November to June and spawn primarily from mid-May to mid-August. Spring-run Chinook migrate upstream March to July and spawn late-August to early-October (Meyers *et al.* 1998). Juveniles emerge from the gravel and typically spend one year in freshwater before migrating downstream to estuaries and then the ocean (Moyle 2002b).

In California, ocean-type Chinook salmon tend to use estuaries and coastal areas for rearing more extensively than stream-type Chinook salmon (Thorpe 1994). Juveniles emerge from the gravel and generally within a matter of months, migrate downstream to the estuary and the ocean (Moyle 2002b, Quinn 2005). Fresh water residence, including outmigration, usually ranges from two to four months. After emergence, Chinook salmon fry seek out areas behind fallen trees, back eddies, undercut banks, and other areas of bank cover. As they grow larger, their habitat preferences change (Everest and Chapman 1972). Juveniles move away from stream margins and begin to use deeper water areas with slightly faster water velocities, but continue to use available cover to minimize the risk of predation and reduce energy expenditure. This life history strategy allows fall-run Chinook salmon to utilize quality spawning and rearing areas in the valley reaches of rivers, which are often too warm to support juvenile salmonid rearing in the summer (Moyle 2002b).

After emergence from redd gravels in the spring, most individuals only rear in the reach for a few weeks to a few months prior to outmigration to the ocean in the late winter through early summer (Moyle 2002). These individuals likely utilize cool water seeps, thermally stratified deep pools, and cool tributaries to escape lethal temperatures as has been documented in juvenile steelhead (Nielsen *et al.* 1994).

2.2.1.3 Steelhead

The present distribution of steelhead extends from the Kamchatka Peninsula in Asia, east to Alaska, and south to southern California. In North America, steelhead is one of six Pacific salmon species that are native to the west coast. However, some steelhead populations have experienced declines in abundance during the past several decades due to various human-induced factors such as habitat loss, and water system development (e.g., storage, withdrawal, conveyance, and diversion for agriculture, flood control, domestic, and hydropower purposes). Steelhead life history patterns are complex, and there is no single factor solely responsible for this decline

Steelhead typically refers to the anadromous form of rainbow trout. Steelhead possess one of the most complex life history patterns of the Pacific salmonid species. Similar to other Pacific salmon, steelhead adults spawn in freshwater and spend a part of their life history at sea. However, unlike Chinook and coho salmon, steelhead exhibit a variety of life history strategies during their freshwater rearing period, and adults may spawn more than once during their life. The typical life history pattern for steelhead is to rear in freshwater streams for two years, followed by up to two or three years of residency in the marine environment. However, juvenile steelhead may rear in freshwater from one to four years (Moyle 2002a).

Steelhead spawn in gravel and small cobble substrates usually associated with riffle and run habitat types. Most young-of-the-year (YOY) fish prefer riffles, while larger (older) fish move into pools. Cover is extremely important in determining distribution; more cover leads to more fish (Meehan and Bjornn 1991). Preferred water temperatures are 13 to 21 °C (55 –70 °F). Most outmigration is during the spring (January to June), but some outmigration may occur during any significant runoff event.

There are two basic steelhead life history patterns, winter-run and summer-run (Quinn 2005, Moyle 2002b). Winter-run steelhead enter rivers and streams from December to March in a sexually mature state, migrate to spawning areas and often ascend long distances, and then spawn soon after in tributaries of mainstem rivers (McEwan and Jackson 1996, Moyle 2002b). Steelhead typically emerge from redd gravels in late spring and early summer, and rear in freshwater for 1–3 years. When water temperatures begin to exceed tolerated levels, juvenile steelhead may seek out cool water seeps and thermally stratified pools (Nielsen *et al.* 1994).

Summer steelhead, also known as spring-run steelhead, enter rivers in a sexually immature state during receding flows in the spring and migrate to headwater reaches of tributary streams where they hold in deep pools until spawning the following winter or spring (Moyle 2002b). Spawning for all runs generally takes place in the late winter or early spring. Eggs hatch in 3 to 4 weeks and fry emerge from the gravel 2 to 3 weeks later (Moyle 2002b). Juveniles spend 1 to 4 years in freshwater before migrating to estuaries and the ocean where they spend 1 to 3 years before returning to freshwater to spawn. Steelhead smolts are usually 15-20 cm total length and migrate to the ocean in the spring (Meehan and Bjornn 1991). Another life history diversity of steelhead is the "half pounder". Half pounder steelhead are sexually immature steelhead that spend about 3 months in estuaries or the ocean before returning to lower river reaches on a feeding run (Moyle 2002b). Half pounders then return to the ocean where they spend 1 to 3 years before returning to freshwater to spawn. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death. However, it is rare for steelhead to spawn more than twice before dying; most that do so are females (Busby *et al.* 1996). Some steelhead "residualize," becoming resident trout and never adopting the anadromous life history.

Upon emerging from the gravel, steelhead fry rear in edgewater habitats and move gradually into pools and riffles as they grow larger; older juveniles establish and defend territories (NMFS 2011a). Cover is an important habitat component for juvenile steelhead, both as velocity refuge and as a means of avoiding predation (Shirvell 1990, Meehan and Bjornn 1991). Summer rearing steelhead tend to use riffles and other habitats not strongly associated with cover more than other salmonids (NMFS 2011a), but winter rearing juvenile steelhead become inactive and hide in any available cover, including large substrate or woody debris (NMFS 2011a).

2.2.1.4 Eulachon

Eulachon are an anadromous fish that are endemic to the northeastern Pacific Ocean. They range from northern California to southwest and south-central Alaska and into the southeastern Bering Sea. The Southern DPS Eulachon spawns in creeks from the US-Canada border down to the Mad River in California. The distribution of the Southern DPS includes the Rogue River and Umpqua Rivers in Oregon, the Columbia River, and some coastal rivers and tributaries to Puget Sound, Washington. Adult eulachon have been recorded at several locations on the Washington and Oregon coasts, and they were previously common in Oregon's Umpqua River and the Klamath River in northern California. Runs occasionally occur in many other rivers and streams, although these tend to be erratic, appearing in some years but not others, and appearing only rarely in some river systems (Hay and McCarter 2000, Willson 2006, NMFS 2010b). In California, they have been documented between Crescent City and Eureka in the Klamath River, Redwood Creek, and Mad River (76 FR 65324).

Eulachon are planktivores that spend the majority of their life in nearshore ocean waters, up to 300 meters in depth. Eulachon typically spend 3 to 5 years in saltwater before returning to freshwater to spawn from late winter through mid-spring. During spawning, males have a distinctly raised ridge along the middle of their bodies. Spawning grounds are typically in the lower reaches of larger snowmelt-fed rivers, with water temperatures ranging from 39 to 50°F

(4 to 10°C). Eggs are fertilized in the water column, and then sink and adhere to the river bottom, typically in areas of gravel and coarse sand. Most eulachon adults die after spawning. Eulachon eggs hatch in 20 to 40 days. The larvae are carried downstream, and are dispersed by estuarine and ocean currents shortly after hatching. Juvenile eulachon move from shallow nearshore areas to mid-depth areas as they grow larger (NMFS 2014c).

2.2.1.5 Green Sturgeon

The green sturgeon is known to range from Baja California to the Bering Sea along the North American continental shelf. During late summer and early fall, subadults and non-spawning adult green sturgeon can frequently be found aggregating in estuaries along the Pacific coast (Emmett *et al.* 1991, Moser and Lindley 2006). Two distinct population segments (DPSs) of North American green sturgeon have been identified; a northern DPS (nDPS) and a southern DPS (sDPS). While individuals from the two DPS's are visually indistinguishable and have significant geographical overlap, current information indicates that they do not interbreed or utilize the same natal streams. The Southern DPS green sturgeon contains a single spawning population in the Sacramento River (NMFS 2005c, NOAA-SWFSC 2005, NMFS 2014d).

Green sturgeon belong to the family Acipenseridae, an ancient lineage of fish with a fossil record dating back approximately 200 million years. They are known to be long lived; green sturgeon captured in Oregon have been aged up to 52 years old, using a fin-spine analysis (Farr *et al.* 2005). Green sturgeon are highly adapted to benthic environments, spending the majority of their lifespan residing in bays, estuaries, and near coastal marine environments. They are anadromous, migrating into freshwater riverine habitats to spawn; and iteroparous as individuals are able to spawn multiple times throughout their lifespan.

Green sturgeon reach sexual maturity between 15–17 years of age (Beamesderfer *et al.* 2007). Green sturgeon fecundity is approximately 50,000–80,000 eggs per adult female (Van Eenennaam *et al.* 2001), and they have the largest egg size of any sturgeon. The outside of the eggs are mildly adhesive, and are denser than those of white sturgeon (Kynard *et al.* 2005, Van Eenennaam *et al.* 2008). Further details of their life history can be found in various literature sources such as (Moyle 2002b, Adams *et al.* 2007, Beamesderfer *et al.* 2007, Israel and Klimley 2008).

2.2.1.6 Black Abalone

Black abalone are marine snails with a univalve shell, typically 5 to 9 open respiratory pores, an anterior head, and a large muscular foot (Cox 1960). Black abalone occupy rocky intertidal habitats from the upper intertidal to 6 meters depth. Historically, black abalone occurred from Crescent City (Del Norte County, California) to southern Baja California (Geiger 2004), but the current range is from Point Arena, California, to Bahia Tortugas, Mexico, including offshore islands (74 FR 1937). Black abalone are most commonly observed in the middle and lower intertidal, in habitats with complex surfaces and deep crevices that provide shelter for juvenile recruitment and adult survival (Leighton 1959, Cox 1960, Leighton 1963, Douros 1985, Douros 1987, VanBlaricom *et al.* 1993, Haaker *et al.* 1995, Leighton 2005). They are able to withstand extreme variations in temperature, salinity, moisture, and wave action, and are usually strongly aggregated, with some individuals stacking two or three on top of each other (Cox 1960, Leighton 2005). Genetic studies indicate limited larval dispersal, with populations composed predominately of individuals spawned locally (Hamm and Burton 2000, Chambers *et al*. 2006, Gruenthal and Burton 2008). Genetic differentiation exists between island populations and mainland populations (Chambers *et al*. 2006).

As broadcast spawners, black abalone must be in close enough proximity to one another to successfully reproduce. They also have a short planktonic larval stage (about 3-10 days) before settlement and metamorphosis (McShane 1992). Larval black abalone are believed to settle on rocky substrate with crustose coralline algae, which serves as a food source for post-metamorphic juveniles, along with microbial and diatom films (Leighton 1959, Leighton 1963, Bergen 1971). Reproductive maturity is reached at a size of about 50 mm shell length in females and about 40 mm in males (Leighton 1959, Ault 1985). Spawning has not been observed in the wild, but likely occurs from spring to early autumn (Leighton 1959, Leighton 1963, Webber and Giese 1969, Leighton 2005).

2.2.2 Status of the Species

2.2.2.1 Southern California

2.2.2.1.1 Southern California Steelhead DPS Status

The geographic range of this DPS extends from the Santa Maria River, near Santa Maria, to the California–Mexico border (NMFS 1997b) and (NMFS 2016f) which represents the known southern geographic extent of the anadromous form of *O. mykiss*.

The abundance of wild steelhead in California has decreased significantly from historic levels (Moyle 2002b). Historically, 46 SC steelhead populations existed (Boughton et al 2007), although over half of the populations have been extirpated (Boughton et al. 2005).This decline prompted listing of the southern California population of steelhead as endangered on August 18, 1997 (62 FR 43937), which includes all naturally spawned populations of steelhead and their progeny originating below long-standing impassable barriers. The endangered status was reaffirmed on January 5, 2006 (71 FR 834). Estimates of historical (pre-1960s) and recent (1990s - current) abundance of steelhead show a precipitous drop in numbers of spawning adults for major rivers within the range of the Southern California Coast (SC) DPS of steelhead. Recent updated status reports indicate that chief causes for the numerical decline of steelhead in southern California include urbanization, water withdrawals, channelization of creeks, human-made barriers to migration, and the introduction of exotic fishes and riparian plants (Good *et al.* 2005b, Williams *et al*. 2011a, NMFS 2016f).

NMFS described historical and recent steelhead abundance and distribution for the southern California coast through a population characterization (Boughton and Goslin 2006). Surveys in Helmbrecht and Boughton (2005) indicate between 58 percent and 65 percent of the historical steelhead basins currently harbor *O. mykiss* populations at sites with connectivity to the ocean. Most of the apparent losses of steelhead were noted in the south, including Orange and San Diego counties (Helmbrecht and Boughton 2005). The majority of losses (68 percent) of steelhead were associated with anthropogenic barriers to steelhead migration (e.g., dams, flood-control structures, culverts, etc.). Additionally, authors found the barrier exclusions were statistically associated with highly-developed watersheds. Only 10 population units possess a high and biologically plausible likelihood of being viable and independent (Boughton and Goslin 2006).

Critical Habitat and Physical or Biological Features for Southern California Steelhead

Critical habitat for the SC DPS was designated on September 2, 2005 (70 FR 52488). Critical habitat for the SC DPS encompasses 708 miles of stream habitat within a small part of San Luis Obispo County, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego counties from the Santa Maria River HU south to the San Juan HU.

We summarize here relevant information from the final rule regarding the PBFs and activities with the potential to affect critical habitat; the final rule provides more detail. The designation identifies PBFs that include sites necessary to support one or more steelhead life stages and, in turn, these sites contain the physical or biological features essential for conservation of the DPS. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, and estuarine areas. The physical or biological features that characterize these sites include water quality, quantity, depth, and velocity, shelter/cover, living space, and passage conditions.

Habitat for steelhead has suffered destruction and modification, and anthropogenic activities have reduced the amount of habitat available to steelhead (Nehlsen *et al* 1991, NMFS 1997b, Boughton and Goslin 2006, 71 FR 834). In many watersheds throughout the range of the SC DPS, the damming of streams has precluded steelhead from hundreds of miles of historical spawning and rearing habitats (e.g., Twitchell Reservoir within the Santa Maria River watershed, Bradbury Dam within the Santa Ynez River watershed, Matilija Dam within the Ventura River watershed, Rindge Dam within the Malibu Creek watershed, Pyramid Dam and Santa Felicia Dam on Piru Creek).

These dams created physical barriers and hydrological impediments for adult and juvenile steelhead migrating to and from spawning and rearing habitats. Likewise, construction and ongoing impassable presence of highway projects have rendered habitats inaccessible to adult steelhead (Boughton and Goslin 2006). Within stream reaches that are accessible to this species (but that may currently contain no fish), urbanization (including effects due to water exploitation) have in many watersheds eliminated or dramatically reduced the quality and amount of living space for juvenile steelhead. The number of streams that historically supported steelhead has been dramatically reduced (Good *et al.* 2005b). Groundwater pumping and diversion of surface water contribute to the loss of habitat for steelhead, particularly during the dry season (e.g., NMFS (2005a), see also Spina (2006)). The extensive loss and degradation of habitat is one of the leading causes for the decline of steelhead abundance in southern California and listing of the species as endangered (71 FR 834 , NMFS 1997b).

A significant amount of estuarine habitat has been lost across the range of the DPS with an average of only 22-percent of the original estuarine habitat remaining (Williams *et al*. 2011a). The condition of these remaining wetland habitats is largely degraded, with many wetland areas at continued risk of loss or further degradation. Although many historically harmful practices have been halted, much of the historical damage remains to be addressed and the necessary restoration activities will likely require decades. Many of these threats are associated with the larger river systems such as the Santa Maria, Santa Ynez, Ventura, Santa Clara, Los Angeles, San Gabriel, Santa Ana, San Luis Rey, Santa Margarita, San Dieguito, and San Diego rivers, but they also apply to smaller coastal systems such as Malibu, San Juan, and San Mateo creeks. Overall, these threats have remained essentially unchanged for the DPS as determined by the last status review (Williams *et al*. 2016) though some individual, site specific threats have been reduced or eliminated as a result of conservation actions such as the removal of small fish passage barriers.

2.2.2.1.2 South-Central California Coast Steelhead Status

The South-Central California Coast (SCCC) DPS of steelhead as threatened on 18 August 1997 (62 FR 43937) and was reaffirmed on January 5, 2006 (71 FR 834).

Boughton et al (2006) identified 41 historically independent populations of SCCC steelhead in the DPS. This DPS occupies rivers from the Pajaro River, Santa Cruz County, south to but not including the Santa Maria River, in Santa Barbara County. The 41 populations are divided into four biogeographical regions including (from north to south): Interior coast range, Carmel Basin, Big Sur Coast, and San Luis Obispo Terrace (Boughton et al. 2007).

The status of the SCCC steelhead populations was assessed by NMFS' Biological Review Team (BRT) in 1996 (Busby *et al.* 1996), 2005 (Good *et al.* 2005b), 2011 (Williams *et al.* 2011a), and 2016 (Williams *et al*. 2016). Abundance of adult steelhead in the SCCC DPS declined from a historical high abundance of 25,000 returning adults, to an estimate of 4,750 adults in 1965 for five river systems (Pajaro, Salinas, Carmel, Little Sur, and Big Sur), to fewer than 500 adults currently (Boughton and Fish 2003, Good *et al.* 2005b, Helmbrecht and Boughton 2005, Williams *et al.* 2011a).

As part of the assessment and listing of SCCC steelhead, the BRT evaluated the viability[9] (discussed in greater detail below) and extinction risk of naturally spawning populations within each DPS. The BRT found high risks to abundance, productivity, and the diversity of the SCCC DPS and expressed particular concern for the DPS's connectivity and spatial structure. NMFS' latest 5-year status review for the South-Central California Coast DPS of steelhead states the following:

> "The extended drought and drying conditions associated with projected climate change has the potential to cause local extinction of *O. mykiss* populations and thus reduce the genetic diversity of fish within the South-Central California Coast Steelhead Recovery Planning Area." (page 55, Williams *et al*. 2016).

Moreover, NMFS' recent assessment of viability for steelhead provides an indication that the South Central California Coast Steelhead DPS may be currently experiencing an increased extinction risk (Williams *et al*. 2016).

[9] Viable populations have a high probability of long-term persistence (> 100 years).

Population Viability

Before NMFS can evaluate the effects of the proposed action on a population and a species, an understanding of the condition of the population and species in terms of their chances of survival and recovery is critical for the effects analysis. The chances of survival and recovery contribute to NMFS' understanding of whether the population is likely to experience viability. Population viability is the hypothetical state(s) in which extinction risk of the broad population is negligible over a 100-year period and full evolutionary potential is retained (Boughton and Goslin 2006).

Four principal parameters are used to evaluate the extinction risk for endangered and threatened species of salmonids: abundance, population growth rate, population spatial structure, and population diversity. These specific parameters are important to consider because they are predictors of extinction risk, and the parameters reflect general biological and ecological processes that are critical to the growth and survival of steelhead (McElhany *et al.* 2000).

There are three basic concepts (adapted from Boughton and Goslin (2006)) that describe the meaning of population viability and how population growth rate and related parameters work together to provide a framework for judging the persistence of a population in the wild. The first concept is that for a population to persist indefinitely, on average each adult fish in the population has to give rise to at least one adult fish in the next generation (i.e., the population of adults must replace itself year after year). The second concept involves the size of the population. The larger the population, the less likely the population is to become extinct and the less likely that all mates will fail to produce eggs. Large population size is the single most important trait to protect a population from being driven to extinction due to random events. The third concept involves the relationship of vital events (e.g., births, deaths, and matings). The more correlated that vital events tend to be across the population, the larger the population has to be to protect it from extinction.

These concepts are expected to apply to the endangered SC DPS and threatened SCCC DPS of steelhead. The largest populations within these two DPSs are needed to support an effective recovery strategy. The role of the largest populations in recovery is based on population theory, which suggests the largest populations would have the highest viability if restored to an unimpaired condition (Boughton and Goslin 2006). In nature, population abundance fluctuates for a variety of reasons including random changes in environmental conditions (often referred to as environmental stochasticity). If the fluctuations are large enough, the number of individuals in the population can fall to zero, even though the population may be relatively large initially. The influence of environmental stochasticity on both DPSs is expected to be high, and because environmental stochasticity increases extinction risk to the population, and to compensate for the environmental influences, both the SC DPS and the SCCC DPS need to have a larger average size than a broad population that is not as affected by chance fluctuations in environmental conditions (Boughton and Goslin 2006).

The expected sources of environmental stochasticity in both DPSs involve drought (and associated features such as high temperatures, low streamflow, lack of sandbar breaching at the mouths of rivers), floods, and wildfire. Southern California experienced a 5-year drought where extensive instream drying was observed in numerous coastal drainages in the range of the SC DPS of steelhead. These drought conditions prompted NMFS and CDFW to collaborate on a high number of steelhead relocations in an attempt to enhance survival of fish in the wild. Under such conditions stream temperature can increase dramatically, exceeding the heat tolerance of fish, and dissolved- oxygen concentration can fall below levels tolerable for steelhead. Finding dead or dying juvenile steelhead is not uncommon under such conditions. In July 2007, the "Zaca" wildland fire was reported and burned over 240,000 acres within and near Santa Barbara County, including steelhead- bearing drainages (Janicki *et al.* 2007).

Based on the complete population viability evaluation and findings in Boughton *et al.* (2006), neither DPS is viable and both are at high risk of extinction. That is, each DPS has a low likelihood of viability (Boughton and Goslin 2006). This finding is consistent with conclusions of past and recent technical reviews (Busby *et al.* 1996, Good *et al.* 2005b, Williams *et al*. 2011a, Williams *et al.* 2016), and the formal listing determinations for the species (62 FR 43937, 71 FR 834).

Spatial structure of a steelhead population is also critical to consider during the jeopardy analysis when evaluating population viability. Each population's spatial structure comprises both the geographic distribution of individuals in the population and the processes that generate that distribution (McElhany *et al.* 2000). Understanding the spatial structure of a population is important because the population structure can affect evolutionary processes and, therefore, alter the ability of a population to adapt to spatial or temporal changes in the species' environment. Populations that are thinly distributed over space are susceptible to experiencing poor population growth rate and loss of genetic diversity (Boughton *et al.* 2007). Because human activities have decreased the total area of habitat, a negative trend on population viability is expected (McElhany *et al.* 2000). Construction and the ongoing impassable presence of man-made structures throughout the Southern California DPS have rendered many habitats inaccessible to adult steelhead (Helmbrecht and Boughton 2005). In many watersheds that are accessible to these species (but that may currently contain few or no fish), urbanization and exploitation of water resources has eliminated or dramatically reduced the quality and amount of living space for steelhead.

Population diversity is an additional factor considered within the viability criteria. Steelhead possess a suite of life-history traits, such as anadromy, timing of spawning, emigration, and immigration, fecundity, age-at-maturity, behavior, physiological and genetic characteristics, to mention a few. The more diverse these traits (or the more these traits are not restricted), the more likely the species is to survive a spatially and temporally fluctuating environment. Factors that constrain the full expression of a trait are expected to affect the diversity of a species (McElhany *et al.* 2000). The loss or reduction in anadromy and migration of juvenile steelhead to the estuary or ocean is expected to reduce gene flow, which strongly influences population diversity (McElhany *et al.* 2000). Evidence indicates genetic diversity in populations of southern California steelhead is low (Girman and Garza 2006).

Habitat is the "templet" for ecological variation in a species (Southwood 1977) and, accordingly, when a species' habitat is altered, the potential for the habitat to promote ecological variation is also altered. Loss or limited migration opportunities are expected to adversely affect the species' basic demographics and evolutionary processes, causing a reduced potential for both DPS units (SCCC and SC) to withstand environmental fluctuations. Activities that affect evolutionary processes (e.g., natural selection) have the potential to alter the diversity of the species. Hence, the widespread effects of anthropogenic activities in southern California are believed to have contributed to a decline in genetic diversity of southern California steelhead (Girman and Garza 2006).

Critical Habitat and Physical or Biological Features for South-Central California Coast Steelhead

Critical habitat for the SCCC DPS was designated on September 2, 2005 (70 FR 52488).

Designated critical habitat for the SCCC DPS includes 1,249-miles of stream habitat and 3-square miles of estuary habitat within Monterey, San Benito, Santa Clara, Santa Cruz, and San Luis Obispo counties from the Pajaro River Hydrologic Sub-area south to the Estero Bay Hydrologic Unit (HU) (to but not including the Santa Maria River HU) including those streams listed above in the Status of the Species section. There are 30 occupied hydrologic sub-unit watersheds within the freshwater and estuarine range of the DPS.

Critical habitat has a lateral extent as defined by the bankfull discharge, also known as a 2-year flood event. Estuarine areas of listed streams are also included in the designation, but the riparian zone is not included in the designation. PBFs within these streams essential for the conservation of the DPS are those sites and habitat components that support one or more steelhead life stages. These include freshwater spawning sites and rearing sites with water quantity and quality sufficient to form and maintain physical habitat conditions that support juvenile growth and mobility. PBFs include natural cover such as shade, submerged and overhanging large wood, logjams, beaver dams, aquatic vegetation, large rocks, boulders, side channels and undercut banks (70 FR 52488). Additional PBFs of critical habitat consist of freshwater migration corridors free of obstruction and excessive predation that have sufficient water quantity and quality, and physical cover within migration corridors that supports steelhead mobility and survival, as well as estuarine areas that also share these attributes. Also listed as PBFs are juvenile and adult steelhead food forage, including aquatic invertebrates and fishes that support steelhead growth and maturation (70 FR 52488).

Streams designated as critical habitat in the SCCC DPS have the above PBF attributes to varying degrees, depending on the stream location and the impacts associated with the watershed. NMFS' most recent status review for SCCC steelhead (Williams *et al.* 2016) identified habitat destruction and degradation as serious ongoing risk factors for this DPS. Urban development, flood control, water development, and other anthropogenic factors have adversely affected the proper functioning and condition of some spawning, rearing, and migratory habitats in streams designated as critical habitat. Urbanization has resulted in some permanent impacts to steelhead critical habitat due to stream channelization, increased bank erosion, riparian damage, migration barriers, and pollution (Williams *et al.* 2016). Many streams within the DPS have dams and reservoirs that reduce the magnitude and duration of flushing stream flows, withhold or reduce water levels suitable for fish passage and rearing, physically block upstream fish passage, and retain valuable coarse sediments for spawning and rearing. In addition, some stream reaches within the DPS' designated critical habitat may be vulnerable to further perturbation resulting from poor land use and management decisions.

Recovery Plans

The recovery plans for SCCC steelhead (NMFS 2013) and SC steelhead (NMFS 2012b) provide additional information on these and other threats and related recovery actions necessary to recover both species within individual watersheds and each DPS as a whole. Both recovery plans highlight a number of high priority DPS-wide recovery actions, including: physically modify passage barriers such as dams and diversion facilities to allow natural rates of migration to upstream spawning and rearing habitats; enhance protection of natural in-channel and riparian habitats, including appropriate management of flood-control activities, off-road vehicle use, and in-river sand and gravel mining practices; reduce water pollutants such as fine sediments, pesticides, herbicides, and other non-point source waste discharges; assess the condition of and restore estuarine habitats through the control of fill, waste discharges, and establishment of buffers; control artificial breaching and/or draining of coastal estuaries; and conduct research on the relationship between resident and anadromous forms of *O. mykiss*, and the population dynamics regarding distribution, abundance, residualization, dispersal, and recolonization rates.

2.2.2.1.3 Black Abalone Status

Black Abalone (*Haliotis cracherodii)* was listed as endangered on February 13, 2009 (74 FR 1937).

Black abalone are believed to be naturally rare at the northern and southern extremes of their range, (Morris *et al.* 1980, VanBlaricom *et al*. 2009). The highest abundances occurred south of Monterey, particularly at the Channel Islands off southern California (Cox 1960, Karpov *et al*. 2000). Rogers-Bennett *et al*. (2002) estimated a baseline abundance of 3.54 million black abalone in California, based on landings data from the peak of the commercial and recreational fisheries (1972-1981). This estimate provides a historical perspective on patterns in abundance and a baseline against which to compare modern day trends. We note, however, that black abalone abundances in the 1970s to early 1980s had reached extraordinarily high levels, particularly at the Channel Islands, possibly in response to the elimination of subsistence harvests by indigenous peoples and large reductions in the sea otter population. Thus, our understanding of black abalone abundance and distribution for this time period may not accurately represent conditions prior to commercial and recreational harvest of black abalone in California.

Beginning in the mid-1980s, black abalone populations began to decline dramatically due to the spread of withering syndrome (Tissot 1995), a disease caused by a Rickettsiales-like organism (WS-RLO) that affects the animal's digestion and causes starvation leading to foot muscle atrophy, lethargy, and death (Friedman and Finley 2003, Friedman *et al.* 2003, Braid *et al.* 2005). Withering syndrome results in rapid (within a few weeks) and massive (reductions of over 80%) mortalities in affected populations (Neuman *et al.* 2010). The first recorded mass mortality associated with the disease was observed at Santa Cruz Island in 1985 (Lafferty and Kuris 1993). Researchers have since recorded mass mortalities at sites throughout the Channel Islands and along the California mainland as far north as Cayucos (San Luis Obispo County) by 1998-1999 (Altstatt *et al*. 1996, Raimondi *et al.* 2002). Withering syndrome was also observed in central Baja California around Bahia Tortugas during El Niño events in the late 1980's and 1990s

(Altstatt *et al*. 1996), (Pedro Sierra-Rodriquiz, pers. comm., cited in (VanBlaricom *et al*. 2009)), and may be linked to declines in the abalone fishery there in the 1990s.

Overall, populations throughout southern California and as far north as Cayucos have declined in abundance by more than 80%; populations south of Point Conception have declined by more than 90% (Neuman *et al.* 2010). Due to the drastic decline in abundance, the black abalone was declared as endangered under the ESA on January 14, 2009 (74 FR 1937). Historical abalone harvest contributed to the decline to some degree, but the primary cause of these declines has been withering syndrome. The disease has also affected populations in Baja California, but little is known about the species' status in Mexico.

Populations north of Cayucos have not yet exhibited signs of the disease, but all are likely infected by the WS-RLO pathogen. Abalone may be exposed to and infected by the WS-RLO without showing symptoms, but once symptoms develop, the animals succumb to death rapidly (Friedman *et al*. 1997, Friedman *et al*. 2000, Friedman *et al.* 2002). The pathogen has been detected in all coastal marine waters of central (Friedman and Finley 2003) and southern California (Moore *et al.* 2002) up to south Sonoma County (Moore 2015), and has also been found at Southeast Farallon Island (pers. comm. with Jim Moore, CDFW/BML, cited in VanBlaricom *et al*. 2009). Disease transmission and manifestation is intensified when local sea surface temperatures increase by as little as 2.5 ºC above ambient levels and remain elevated over a prolonged period of time (i.e., a few months or more) (Friedman *et al*. 1997, Raimondi *et al.* 2002, Harley and Rogers-Bennett 2004, Vilchis *et al.* 2005). Thus, the northward progression of the disease appears to be associated with increasing coastal warming and El Niño events (Tissot 1995, Altstatt *et al*. 1996, Raimondi *et al.* 2002), and poses a continuing threat to the remaining healthy populations.

Most black abalone populations affected by withering syndrome remain at low densities, below the estimated levels needed to support successful reproduction and recruitment (0.34 abalone per m^2) (Neuman *et al.* 2010). Data for 2002-2006 indicate that population densities exceed this threshold value in areas not yet affected by the disease (north of Cayucos; densities range from 1.1 to 10.5 abalone per m^2), whereas population densities fall below this threshold value, many significantly so, in areas affected by the disease (south of Cayucos; densities range from 0 to 0.5 abalone per m^2) (Neuman *et al.* 2010). Despite these low densities, however, researchers have observed evidence of recent recruitment and increases in abundance at several locations throughout southern California, including the Palos Verdes Peninsula, Laguna Beach, Santa Cruz Island, San Miguel Island, and San Nicolas Island (Richards and Whitaker 2012, Eckdahl 2015, VanBlaricom 2015). These observations for black abalone, and similar observations for other abalone species in California, indicate that factors other than the number of abalone per square meter need to be considered when assessing population viability. In addition, recent studies indicate the potential for disease resistance to develop in wild black abalone populations. A bacteriophage has been discovered that infects the WS-RLO, reduces its pathogenicity, and improves the survival of infected abalone (Friedman and Crosson 2012, Crosson 2014, Friedman *et al.* 2014). Genetic-based disease resistance may also exist and is the subject of ongoing studies at the University of Washington (VanBlaricom *et al*. 2009).

Overall Risk of Extinction and Recovery Potential

Black abalone populations throughout California face high risk in each of four demographic risk criteria: abundance, growth rate and productivity, spatial structure and connectivity, and diversity (VanBlaricom *et al*. 2009). Although we know withering syndrome has affected populations in Baja California, little information exists regarding the species' status in that portion of the range. Long-term monitoring data in California indicates that disease-impacted populations remain at low abundance and density, and the disease continues to progress northward along the coast with warming events, threatening the remaining healthy populations (Raimondi *et al.* 2002). The declines in abundance have potentially resulted in a loss of genetic diversity, though this needs to be evaluated. Although some sites in southern California have shown evidence of recruitment, natural recovery of severely-reduced abalone populations will likely be a slow process. Recovering the species will involve protecting the remaining healthy populations to the north that have not yet been affected by the disease, and increasing the abundance and density of populations that have already been affected by the disease.

Critical Habitat and Physical or Biological Features for Black Abalone

NMFS designated critical habitat for black abalone on October 27, 2011 (76 FR 66806). The designation encompasses rocky intertidal and subtidal habitat (from the mean higher high water, MHHW, line to a depth of -6m relative to the mean lower low water, MLLW, line) within five segments of the California coast between Del Mar Landing Ecological Reserve to the Palos Verdes Peninsula, as well as on the Farallon Islands, Año Nuevo Island, San Miguel Island, Santa Rosa Island, Santa Cruz Island, Anacapa Island, Santa Barbara Island, and Santa Catalina Island. PBFs include: (1) rocky substrate (e.g., rocky benches formed from consolidated rock or large boulders that provide complex crevice habitat); (2) food resources (e.g., macroalgae); (3) juvenile settlement habitat (rocky substrates with crustose coralline algae and crevices or cryptic biogenic structures); (4) suitable water quality (e.g., temperature, salinity, pH) for normal survival, settlement, growth, and behavior; and (5) suitable nearshore circulation patterns to support successful fertilization and larval settlement within appropriate habitat.

Critical habitat areas within the non-disease impacted region (north of Cayucos) were generally identified as areas of high conservation value, because they serve as a refuge from withering syndrome, support stable populations, and contain habitat of good to excellent quality for black abalone. Within the disease-impacted region (south of Cayucos), changes to critical habitat features have occurred following the decline in black abalone. For example, at sites once dominated by black abalone, the decline in black abalone numbers has resulted in a shift in the invertebrate and algal community where increased growth of encrusting species like sponges may reduce the surface area for crustose coralline algae to grow, thereby reducing the quality of larval settlement habitat (Toonen and Pawlik 1994, Miner *et al*. 2006, VanBlaricom *et al*. 2009, 76 FR 66806). However, in general, these critical habitat areas continue to provide a high conservation value to the species, because they contain habitat of good to excellent quality that is able to support black abalone, with evidence of recruitment observed at a few sites (e.g., on San Nicolas Island and Santa Cruz Island) (VanBlaricom *et al*. 2009).

Threats to black abalone critical habitat include coastal development or in-water construction projects (e.g., coastal armoring, pier construction or repair); activities that can increase sedimentation (e.g., sand replenishment, beach nourishment, side-casting); oil or chemical spills and response activities; and vessel grounding and response activities. Operations that involve withdrawing water from and/or discharging water to marine coastal waters may also affect black abalone critical habitat by increasing local water temperatures (e.g., discharge of heated effluent), introducing elevated levels of metals or other contaminants into the water, or altering nearshore circulation patterns.

2.2.2.2 Central California Coast

2.2.2.2.1 Central California Coast Steelhead DPS Status

The CCC steelhead DPS includes all naturally spawned anadromous populations originating below natural and manmade impassable barriers in California streams from the Russian River (inclusive) to Aptos Creek (inclusive), and the drainages of San Francisco, San Pablo, and Suisun bays, eastward to Chipps Island at the confluence of the Sacramento and San Joaquin Rivers.

Historically, approximately 70 populations of steelhead existed in the CCC steelhead DPS (Spence *et al*. 2012, Spence *et al*. 2008). Many of these populations (about 37) were independent, or potentially independent, meaning they had a high likelihood of surviving for 100 years absent anthropogenic impacts (Bjorkstedt *et al.* 2005). The remaining populations were dependent upon immigration from nearby CCC steelhead DPS populations to ensure their viability (McElhany *et al.* 2000, Bjorkstedt *et al.* 2005)

While historical and present data on abundance are limited, CCC steelhead numbers are substantially reduced from historical levels. A total of 94,000 adult steelhead were estimated to spawn in the rivers of this DPS in the mid-1960s, including 50,000 fish in the Russian River - the largest population within the DPS (Busby *et al.* 1996). By the late 90s, that number had dropped to approximately 4,000 fish (NMFS 1997b). Abundance estimates for smaller coastal streams in the DPS indicate low but stable levels with recent estimates for several streams (Lagunitas, Waddell, Scott, San Vicente, Pudding, Caspar creeks) of individual run sizes of 500 fish or less (62 FR 43937). Some loss of genetic diversity has been documented and attributed to previous among-basin transfers of stock and local hatchery production in interior populations in the Russian River (Bjorkstedt *et al.* 2005), and the ratio of hatchery fish to natural origin fish returning to spawn continues to be a source of concern (William *et al.* 2016). In San Francisco Bay streams, reduced population sizes and fragmentation of habitat has likely also led to loss of genetic diversity in these populations. For more detailed information on trends in CCC steelhead abundance, see: (Busby *et al.* 1996, NMFS 1997b, Good *et al.* 2005a, Spence *et al*. 2008, Williams *et al*. 2011a, Williams *et al.* 2016).

CCC steelhead have experienced serious declines in abundance and long-term population trends suggest a negative growth rate. This indicates the DPS may not be viable in the long term. DPS populations that historically provided enough steelhead immigrants to support dependent populations may no longer be able to do so, placing dependent populations at increased risk of extirpation. However, because CCC steelhead remain present in most streams throughout the DPS, roughly approximating the known historical range, CCC steelhead likely possess a resilience that is likely to slow their decline relative to other salmonid DPSs or ESUs in worse condition. The 2005 status review concluded that steelhead in the CCC steelhead DPS remain "likely to become endangered in the foreseeable future" (Good *et al.* 2005b). On January 5, 2006, NMFS issued a final determination that the CCC steelhead DPS is a threatened species, as previously listed (71 FR 834).

A more recent viability assessment of CCC steelhead concluded that populations in watersheds that drain to San Francisco Bay are highly unlikely to be viable, and that the limited information available did not indicate that any other CCC steelhead populations could be demonstrated to be viable (Spence *et al*. 2008). The most recent status update concludes that steelhead in the CCC steelhead DPS remains "likely to become endangered in the foreseeable future" (NMFS 2016i), as new and additional information available since Williams *et al*. (2011a) does not appear to suggest a change in extinction risk.

The Multispecies Recovery Plan (NMFS 2015) for the CCC steelhead identifies multiple recovery actions, including: increasing quality and extent of estuarine habitat; rehabilitating and enhancing floodplain connectivity; improving flow conditions; modifying or removing physical passage barriers; improving riparian conditions; and reducing toxicity and pollutants.

2.2.2.2.2 Central California Coast Coho Salmon ESU Status

The CCC coho ESU was listed as endangered under the ESA on June 28, 2005 (70 FR 37160). This includes naturally spawned coho salmon encompassing reaches of all rivers (including estuarine areas and tributaries) between Punta Gorda and San Lorenzo River; including two streams entering the San Francisco Bay: (1) Arroyo Corte Madera Del Presidio; and (2) Corte Madera Creek (NMFS 2012a).

Historically, the CCC coho salmon ESU was comprised of approximately 76 coho salmon populations. Most of these were dependent populations that needed immigration from other nearby populations to ensure their long term survival, as described above. Historically, there were 11 functionally independent populations and one potentially independent population of CCC coho salmon (Spence *et al*. 2008, Spence *et al*. 2012). Most of the populations in the CCC coho salmon ESU are currently doing poorly; low abundance, range constriction, fragmentation, and loss of genetic diversity is documented, as described below.

Brown *et al.* (1994) estimated that annual spawning numbers of coho salmon in California ranged between 200,000 and 500,000 fish in the 1940s, which declined to about 100,000 fish by the 1960s, followed by a further decline to about 31,000 fish by 1991. More recent abundance estimates vary from approximately 600 to 5,500 adults (Good *et al.* 2005b). Past status reviews (Williams *et al*. 2011a) indicate that the CCC coho salmon are likely continuing to decline. CCC coho salmon have also experienced acute range restriction and fragmentation. (Adams 1999) found that in the mid 1990s coho salmon were present in 51 percent (98 of 191) of the streams where they were historically present, and documented an additional 23 streams within the CCC coho salmon ESU in which coho salmon were found for which there were no historical records. Recent genetic research in progress by both the NMFS Southwest Fisheries Science Center and the Bodega Marine Laboratory has documented a reduction in genetic diversity within subpopulations of the CCC coho salmon ESU (Bjorkstedt *et al.* 2005). The influence of hatchery fish on wild stocks has also contributed to the lack of diversity through outbreeding depression and disease.

Available data from the few remaining independent populations shows continuing declines and many independent populations that supported the species overall numbers and geographic distributions have been extirpated. This suggests that populations that historically provided support to dependent populations via immigration have not been able to provide enough immigrants for many dependent populations for several decades. The near-term (10 - 20 years) viability of many of the extant independent CCC coho salmon populations is of serious concern. These populations may not have enough fish to survive additional natural and human caused environmental change.

The substantial decline in the Russian River coho salmon abundance led to the formation of the Russian River Coho Salmon Captive Broodstock Program (RRCSCBP) in 2001. Under this program, offspring of wild captive-reared coho salmon are released as juveniles into tributaries within their historic range with the expectation that some of them will return as adults to naturally reproduce. Juvenile coho salmon and coho salmon smolts have been released into several tributaries of the lower Russian River, including Austin Creek and Dry Creek.

None of the five diversity strata defined by (Bjorkstedt *et al.* 2005) currently support viable populations. According to Williams *et al.* (2016), recent surveys suggest CCC coho abundance has improved slightly since 2011 within several independent populations (mainly north of SF bay), although all populations remain well below their high-risk dispensation thresholds identified by (Spence *et al*. 2008). The Russian River and Lagunitas Creek populations are relative strongholds for the species compared to other CCC ESU populations, the former predominantly due to out-planting of hatchery-reared juvenile fish from the RRCSCBP. The overall risk of CCC coho salmon extinction remains high, and the most recent status review reaffirmed the ESU's endangered status (Williams *et al.* 2016).

The Recovery Plan for the CCC coho salmon (NMFS 2012a) outlines a short term strategy to prevent extinction of the ESU. The ESU recovery actions are summarized as follow: Immediately implement restoration to improve freshwater survival of all life stages; continue and seek long-term funding for population and habitat monitoring; incentivize landowners to maintain forestlands and restore unproductive timberland; pursue protection and preservation of key habitats (e.g., Conservation Banks); and establish CCC coho salmon plan outreach and implementation groups across the ESU.

Critical Habitat and Physical or Biological Features for California Central Coast Steelhead and California Central Coast Coho Salmon

PBFs for CCC steelhead critical habitat, and their associated essential features within freshwater include:

- freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;

- freshwater rearing sites with:

  - water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
  - water quality and forage supporting juvenile development; and
  - natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
- freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

For CCC coho salmon critical habitat the following essential habitat types were identified: (1) juvenile summer and winter rearing areas; (2) juvenile migration corridors; (3) areas for growth and development to adulthood; (4) adult migration corridors; and (5) spawning areas. Within these areas, essential features of coho salmon critical habitat include adequate: (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions (64 FR 24049).

The condition of CCC coho salmon and CCC steelhead critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that currently depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat[10]: logging, agriculture, mining, urbanization, stream channelization and bank stabilization, dams, wetland loss, and water withdrawals (including unscreened diversions for irrigation). Impacts of concern include altered stream bank and channel morphology, elevated water temperature, lost spawning and rearing habitat, habitat fragmentation, impaired gravel and wood recruitment from upstream sources, degraded water quality/quantity, lost riparian vegetation, and increased erosion into streams from upland areas (Weitkamp *et al*. 1995, Busby *et al.* 1996, 64 FR 24049, 70 FR 37160, 70 FR 52488). Diversion and storage of river and stream flow has dramatically altered the natural hydrologic cycle in many of the streams within the ESU. Altered flow regimes can delay or preclude migration, dewater aquatic habitat, and strand fish in disconnected pools, while unscreened diversions can entrain juvenile fish.

[10] Other factors, such as over fishing and artificial propagation have also contributed to the current population status of these species. All these human induced factors have exacerbated the adverse effects of natural environmental variability from such factors as drought and poor ocean conditions.

2.2.2.3 Northern California

2.2.2.3.1 California Coastal Chinook Salmon ESU Status

The CC Chinook salmon ESU was listed as a threatened species in 1999 (64 FR 50394). This ESU includes all Chinook populations from streams immediately south of the Klamath River in northern California to and including the Russian River. The threatened status of this ESU was reaffirmed in 2005 and seven small artificial propagation programs were also added to the listed ESU (70 FR 37160). NMFS determined that these artificially propagated stocks are no more divergent relative to the local natural population(s) than what would be expected between closely related natural populations within the ESU. Since 2005, all seven artificial programs have been terminated. Genetic data from Chinook salmon populations spawning in streams south of the Russian River and in several tributaries to San Francisco Bay suggest that populations spawning between the Russian River and Golden Gate are part of the CC Chinook salmon ESU (Williams *et al*. 2011c) and should be included in the listing.

Bjorkstedt *et al.* (2005) determined that the CC Chinook salmon ESU historically comprised 15 independent populations (*i.e*., 10 functionally independent and 5 potentially independent) of fall run Chinook salmon and six independent populations (all functionally independent) of spring-run Chinook salmon. The lack of historical data on Chinook salmon in smaller watersheds within this ESU, none of which currently support persistent populations of Chinook salmon, confounded efforts to identify dependent populations. The TRT tentatively identified 17 watersheds as possibly supporting dependent populations, but suggested that perhaps only two of these were consistently occupied by Chinook salmon. Populations were assigned to four geographically based strata, with two of these strata further subdivided into fall-run and spring run life history types (Bjorkstedt *et al.* 2005 modified in Spence *et al*. 2008). Based on the limited ancillary data that was available, the TRT concluded that six independent populations of fall Chinook salmon in this ESU were at high risk of extinction or possibly extinct, including the Ten Mile, Noyo, Big, Navarro, Garcia, and Gualala river populations. One population of fall-run Chinook was determined to be at moderate or high risk (Mattole River), and the remaining populations were deemed to be data deficient. All six putative historical populations of spring-run Chinook salmon were believed extinct (Spence *et al*. 2008).

A status review update by the Southwest Fisheries Science Center (SWFSC) in 2011 concluded that the lack of population-level estimates of abundance for Chinook salmon populations in this ESU continues to hinder viability assessment (Williams *et al*. 2011c). However, based on a consideration of all new information since the previous status review (Good *et al.* 2005a), the SWFSC did not find evidence of a substantial change in the biological status of the ESU. The status review did, however, cite several concerns about the ESU including the apparent loss of populations from one diversity stratum, the loss of the spring-run life history type from two diversity strata, and the diminished connectivity between populations in the northern and southern halves of the ESU. These concerns were generally recognized at the time of the previous status review, but were considered more significant in this review given the recently developed population viability criteria for this ESU. Overall, the SWFSC update concluded that the biological status of this ESU is unchanged from that described by (Good *et al.* 2005a) who considered it likely to become endangered in the foreseeable future. In 2016, NMFS (2016) completed another status review update and concluded that the collective risk to the persistence of the CC Chinook ESU has not changed significantly since the 2011 status review.

Current Distribution and Abundance

A common theme in the ESA status determinations for Chinook salmon is the sparseness of spawner abundance data (O'Farrell *et al.* 2012). There is a lack of adult spawner estimates spanning 3-4 generations for any of the populations, which prevents application of the viability criteria developed for this ESU (Spence *et al*. 2008). Additionally, the lack of historical population abundance estimates is a major uncertainty. For example, Chinook salmon are periodically observed in many mid-sized watersheds (i.e., Big River, Ten Mile River, Noyo River, Navarro River, Garcia River, and Gualala River) in the region between Cape Mendocino and the Russian River (Spence et al. 2008). However, these watersheds currently do not appear to support persistent populations, and there remains substantial uncertainty about whether they did historically (Bjorkstedt *et al.* 2005). The paucity of historical evidence may reflect in part the fact that substantial modification of habitats due to logging, splash-damming, and other forestry-related activities had already taken place by the late-1800s (Spence *et al*. 2008). Population trends throughout most of the ESU appear to be negative, and some local populations may have been extirpated.

Low abundance, generally negative trends in abundance, reduced distribution, and profound uncertainty as to risk related to the relative lack of population monitoring in California have contributed to NMFS' concern that CC Chinook salmon are at risk of becoming endangered in the foreseeable future throughout all or a significant portion of their range (NMFS 2011a). Where monitoring has occurred, Good *et al.* (2005a) found that historical and current information indicates that CC Chinook salmon populations are depressed. Uncertainty about abundance and natural productivity, and reduced distribution are among the risks facing this ESU. Concerns regarding the lack of population-level estimates of abundance, the loss of populations from one diversity stratum, as well as poor ocean survival contributed to the conclusion that CC Chinook salmon are "likely to become endangered" in the foreseeable future (Good *et al.* 2005a, NMFS 2011, Williams et al. 2016).

In the 1960s, Chinook salmon abundance in the Eel River Basin was considerably higher than other basins in the CC Chinook salmon ESU (Good *et al.* 2005a). CC Chinook appear to have substantially declined from historical abundance (Good *et al.* 2005a), though little reliable annual population data exists. Current population trends throughout most of the CC Chinook salmon ESU appear to be negative; however, very little recent data is available (Good *et al.* 2005a).

Factors Responsible for Decline

At the time of listing, Chinook salmon and their habitat within the range of this ESU were adversely affected by logging, road construction, urban development, mining activities, agriculture, ranching and recreation (NMFS 2008b, 64 FR 50394, 70 FR 37160). These activities resulted in the loss, degradation, simplification, and fragmentation of Chinook salmon habitat. A wide range of impacts resulted from these activities including: alteration of steam banks and channel morphology, alteration of ambient water temperatures, degradation of water quality, elimination of spawning and rearing habitat, elimination of spawning gravels and large woody debris, removal of riparian vegetation and increased stream sedimentation. The effects of periodic flood events exacerbate the adverse effects of these activities. Additionally, the distribution of the Chinook salmon in this ESU has been curtailed by dam construction. The spring-run life history form, which historically spawned and reared in upstream portions of certain watersheds, was heavily impacted by construction of dams and has been completely extirpated from this ESU. Warm Springs and Coyote Dams in the Russian watershed and Scott Dam on the Eel were cited at the time of listing as curtailing or blocking access to spawning and rearing habitat within this ESU. Peters Dam on Lagunitas Creek was also cited as a migration barrier even though the watershed was not included in originally defined ESU.

Overutilization for recreational purposes is considered to be one of the primary reasons for the decline of the CC Chinook salmon ESU. Chinook salmon have supported, and continue to support tribal, commercial, and recreational fisheries, and artificial production, supplementation, and broodstock collection activities. Overfishing in the early days of European settlement depleted many Chinook salmon stocks prior to the impact of more recent habitat degradation (NMFS 1998). Unsustainable harvest rates after extensive habitat degradation likely contributed to further decline of Chinook salmon populations.

Both freshwater and ocean harvest impacts have been reduced over time by active management. Freshwater harvest is managed by CDFW. Ocean harvest is managed by the Pacific Fisheries Management Council (PFMC). Although modern harvest rates have not been estimated directly for the CC Chinook salmon ESU, they may be comparable to rates on Klamath fall-run Chinook salmon (NMFS 1998). Past ocean harvest rate for this population was estimated at 21 percent (PFMC 1996 as cited in NMFS 1998), and freshwater and estuarine harvest rate between 25-30 percent (PFMC 1996 as cited in NMFS 1998).

Artificial propagation of Chinook salmon and other salmonids was also identified as a potential threat to this and other ESUs at the time of their listing. Artificial propagation of salmonids can have a wide range of beneficial or detrimental effects on salmon populations (64 FR 50394, 70 FR 37160). At the time of the status review in 2005, seven artificial propagation programs were considered part of this ESU and eventually listed. Most of these artificial propagation programs were small, cooperative programs authorized by the CDFG. In making its 2005 listing finding for this ESU, we considered the effects of these hatchery programs on the viability of the naturally spawning populations of Chinook salmon in this ESU. In general, our assessment concluded that these programs slightly increased the abundance of Chinook salmon in the ESU, but did not have any beneficial (or adverse) impacts on productivity, spatial structure or diversity of Chinook salmon populations, in large part because the programs were very small and broadly distributed over the ESU. Overall, we concluded that hatchery programs in this ESU did not provide significant benefits to the ESU and could have potential adverse impacts. Since the status review in 2005, all seven artificial propagation programs have been terminated and they no longer have any impacts on naturally spawning Chinook salmon populations within the ESU.

At the time of listing, several natural factors were identified that could adversely affect Chinook salmon populations in this ESU including variability in ocean habitat conditions, drought, flooding, fire, and landslides. Although Chinook salmon and other salmonids clearly survived such natural events over the millennia, there was concern that these types of factors could threaten Chinook populations if coupled with deteriorating freshwater habitat conditions. Cyclic ocean conditions, for example, could affect food supply, predator distribution and abundance, migratory patterns, and overall survival (NMFS 1998). Droughts and floods might reduce Chinook salmon spawning, rearing, and migration habitat, particularly in conjunction with previously described land and water use activities that modify or degrade habitat conditions. Similarly, fire events, particularly if coupled with modified or degraded habitat conditions, could affect woody debris recruitment, shade, and soil stability. Landslides could affect riparian vegetation and sedimentation.

Critical Habitat and Physical or Biological Features for California Coastal Chinook Salmon

Critical habitat for CC Chinook salmon was designated as occupied watersheds from the Redwood Creek watershed, south to and including the Russian River watershed (70 FR 52488).

Designated critical habitat for CC Chinook salmon steelhead includes the stream channels up to the ordinary high-water line (50 CFR 226.211). In areas where the ordinary high-water line has not been defined pursuant to 50 CFR 226.211, the lateral extent is defined by the bankfull elevation. Critical habitat in estuaries is defined by the perimeter of the water body as displayed on standard 1:24,000 scale topographic maps or the elevation of extreme high water, whichever is greater.

Humboldt Bay and the Eel River estuary are designated as critical habitat for the CC Chinook salmon ESU. Some areas within the geographic range were excluded due to economic considerations. Critical habitat was not designated on Indian lands. Designated critical habitat for CC Chinook salmon overlaps the action area. In designating critical habitat for CC Chinook salmon, NMFS focused on areas that are important for the species' overall conservation by protecting quality growth, reproduction, and feeding. The critical habitat designation for these species identifies the known physical and biological features that are necessary to support one or more Chinook salmon life stages, including: (1) freshwater spawning, (2) freshwater rearing, (3) freshwater migration, (4) estuarine areas, (5) nearshore marine areas, and (6) offshore marine areas. Essential elements of CC Chinook salmon critical habitats include adequate (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, (10) safe passage conditions, and (11) salinity conditions (70 FR 52488).

The condition of CC Chinook salmon critical habitat, specifically its ability to provide for their conservation, is degraded from conditions known to support viable salmonid populations. NMFS has determined that present depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat: logging, agricultural and mining activities, urbanization, stream channelization, dams, freshwater and estuarine wetland loss, and water withdrawals for irrigation. All of these factors were identified when CC Chinook salmon were listed as threatened under the ESA, and they all continue to affect this ESU. However, efforts to improve CC Chinook salmon critical habitat have been widespread and are expected to benefit the ESU.

The Multispecies Recovery Plan (NMFS 2015) for the CC Chinook identifies multiple recovery actions, including: increasing quality and extent of estuarine habitat; rehabilitating and enhancing floodplain connectivity; improving flow conditions; modifying or removing physical passage barriers; improving riparian conditions; and reducing toxicity and pollutants.

2.2.2.3.2 Southern Oregon Northern California Coho Salmon Status

On July 19, 1995, NMFS announced its status finding and intent to propose the SONCC coho salmon ESU, which includes populations spawning from the Elk River (Oregon) in the north to the Mattole River (California) in the south, as threatened under the ESA. Our finding was published in the Federal Register on July 25, 1995 (60 FR 38011) and made final on April 25, 1997. NMFS published its final decision to list SONCC coho salmon as threatened under the ESA on May 6, 1997 (62 FR 24588).

In 2005, NMFS reaffirmed SONCC coho salmon status as a threatened species and listed three hatchery stocks as part of the ESU (70 FR 37160). NMFS completed a status review of the SONCC coho salmon ESU (Williams *et al*. 2011a) and determined that the ESU, although trending in declining abundance, should remain listed as threatened. The primary factors affecting diversity of SONCC coho salmon appear to be low population abundance, ocean survival conditions, and drought effects (Williams *et al*. 2011a). The most recent status review was completed in 2016, and NMFS determined that drought and ocean conditions seem to be driving recent declines in abundance, however there does not appear to be a change in extinction risk since the 2011 status review (Williams *et al*. 2016).

Population Viability

Abundance

Quantitative population-level estimates of adult spawner abundance spanning more than 9 years are scarce for the SONCC ESU coho salmon. New data since publication of the previous status review (Good *et al.* 2005b) consists of continuation of a few time series of adult abundance, expansion of efforts in coastal basins of Oregon to include SONCC ESU coho salmon populations, and continuation and addition of several population scale monitoring efforts in California. Other than the Shasta River and Scott River adult counts, reliable current time series of naturally produced adult spawners are not available for the California portion of the SONCC ESU at the population scale.

Although long-term data on coho salmon abundance in the SONCC-Coho Salmon ESU are scarce, all available evidence from available trends since 2011 assessment (Williams *et al*. 2011) indicate little change since the 2011 assessment (Williams *et al.* 2016). Most of the 30 independent populations in the ESU are at high risk of extinction because they are below or likely below their depensation threshold, which can be thought of as the minimum number of adults needed for survival of a population.

Populations that are under depensation have increased likelihood of being extirpated. To summarize conditions across the ESU, extirpations have already occurred in the Eel River basin and are likely in the interior Klamath River basin for one or all year classes (e.g., Shasta and Scott rivers), Bear River, and Mattole River. One population contains critically low numbers (i.e., Upper Mainstem Eel River; with only a total of 7 coho salmon adults counted at the Van Arsdale Fish Station in over six decades) (Jahn 2010).

SONCC coho salmon populations have declined dramatically throughout their range (CDFG 2002, Williams *et al.* 2006). The highest recorded count through the Van Arsdale Fish Station was 47 in 1946-1947 (Harris 2015). In 1965, 14,000 adult coho salmon were estimated in the entire Eel River Basin (CDFG 1965 as cited in Good *et al.* 2005b), while only 4,400 were estimated in 1984 (Wahle and Pearson 1987 as cited in Good *et al.* 2005b) and around 2,000 from 1987–1991 (Brown *et al.* 1994 as cited in Good *et al.* 2005b). Recent status reviews indicate populations continue to be depressed relative to historical numbers, with numerous populations extirpated from tributaries throughout their historical range (Williams *et al.* 2011a, Williams *et al.* 2016).

Diversity

Williams *et al.* (2006) classified SONCC coho salmon populations as dependent or independent based on their historic population size. Independent populations are populations that historically would have had a high likelihood of persisting in isolation from neighboring populations for 100 years and are rated as functionally independent (FI) and potentially independent (PI). Core population types are independent populations judged most likely to become viable most quickly. Non-core 1 population types are independent populations judged to have lesser potential for rapid recovery than the core populations. Non-Core 2 populations were identified in response to the requirement that "most" (not all) independent populations should be at moderate risk of extinction, which allows that some independent populations do not need to be either at moderate risk or low risk. For some independent populations, there is little to no documentation of coho salmon presence in the last century, and prospects are low for the population to recover to numbers at least four spawners per kilometer of intrinsic potential habitat. These populations are categorized as Non-Core 2 populations (NMFS 2014). Dependent populations are populations that historically would not have had a high likelihood of persisting in isolation for 100 years. These populations relied upon periodic immigration from other populations to maintain their abundance. Two ephemeral populations are defined as populations both small enough and isolated enough that they are only intermittently present (McElhany *et al.* 2000, Williams *et al.* 2006, NMFS 2014b).

Given the recent trends in abundance across the ESU, the genetic and life history diversity of populations is likely very low and is inadequate to contribute to a viable ESU. Williams *et al.* (2011a) indicated that the biological status of the SONCC coho salmon ESU has worsened since 2005, and the primary factors currently affecting diversity of SONCC coho salmon appear to be low population abundance, ocean survival conditions, and drought.

Distribution

The historical population structure (Williams *et al.* 2006), coho salmon status reviews (Good *et al.* 2005, Williams *et al*. 2011a, William *et al.* 2016), and the presence and absence update for the northern California portion of the SONCC coho salmon ESU (Brownell *et al.* 1999) summarize historical and current distributions of SONCC coho salmon in northern California.

The distribution of SONCC coho salmon within the ESU is reduced and fragmented, as evidenced by an increasing number of previously occupied streams from which SONCC coho salmon are now absent (NMFS 2001, Good *et al.* 2005b, Williams *et al.* 2011b). Scientists at the

NMFS Southwest Fisheries Science Center compiled a presence-absence database for the SONCC coho salmon ESU (NMFS 2014b) using information for coho salmon streams listed in (Brown and Moyle 1991) as well as other streams where NMFS found historical or recent evidence of coho salmon presence. (Brown and Moyle 1991) identified 396 streams within the ESU as historic coho salmon streams.

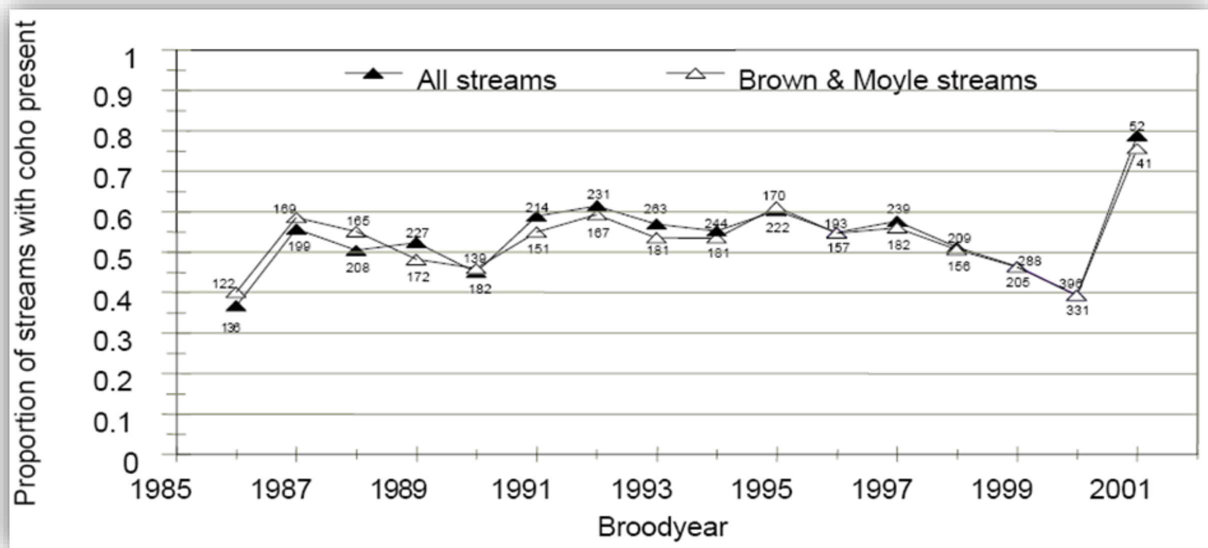

Figure 1. Number of streams with coho salmon present (number of streams surveyed reported next to data point)

Using the NMFS database, (Good *et al.* 2005b) compiled information on the presence of coho salmon in streams throughout the SONCC ESU (Figure 1), which closely matched the results of (Brown and Moyle 1991). (Garwood 2012) compiled coho salmon data through 2004 to generate a historical coho salmon stream list for the California watersheds of the SONCC ESU. (Garwood 2012) verified the presence of juvenile coho in 325 of the streams from the (Brown and Moyle 1991) study, and identified 217 additional streams. From 2001 to 2003, the California Department of Fish and Game (CDFG) conducted 628 surveys in 301 streams across the California portion of the SONCC ESU. Coho salmon were detected in 153 of 245 sampled historic coho salmon streams (Garwood 2012).

The number of streams and rivers currently supporting coho salmon in this ESU has been greatly reduced from historical levels, and watershed-specific extirpations of coho salmon have been documented (Brown et al. 1994, CDFG 2004, Good *et al.* 2005b, Moyle *et al*. 2008, Yoshiyama and Moyle 2010). In summary, information on the SONCC ESU of coho salmon indicates that their distribution within the ESU has been reduced and fragmented, as evidenced by an increasing number of previously occupied streams from which they are now absent (Williams *et al.* 2011b). However, extant populations can still be found in all major river basins within the ESU (70 FR 37160).

Given that all diversity strata are occupied (Williams *et al.* 2011b), the spatial structure of the SONCC coho salmon ESU is broadly distributed throughout its range. However, extirpations, loss of brood years, and sharp declines in abundance (in some cases to zero) of SONCC coho salmon in several streams throughout the ESU indicate that the SONCC coho salmon's spatial structure is more fragmented at the population-level than at the ESU scale.

Factors Responsible for Decline

The factors that caused declines in the SONCC ESU of coho salmon include hatchery practices, climate change, ocean conditions, habitat loss due to dam building, degradation of freshwater habitats due to a variety of agricultural and forestry practices, water diversions, urbanization, over-fishing, mining; and severe flood events exacerbated by land use practices (Good et al. 2005, NMFS 2014).

Sedimentation and loss of spawning gravels associated with poor forestry practices and roadbuilding are particularly chronic problems that can reduce the productivity of salmonid populations. Non-native Sacramento pikeminnow (Ptychocheilus grandis) have been observed in the Eel River basin and could be acting as predators on juvenile steelhead as thermal conditions lead to niche overlap of the two species (Good et al. 2005). Droughts and unfavorable ocean conditions during the late 1980s and early 1990s were identified as likely causes of decreased abundance of SONCC coho salmon (Good et al. 2005). Reduced flows can cause increases in water temperature, resulting in increased heat stress to fish and thermal barriers to migration.

MacFarlane et al. (2008) compared data on adult returns of returning coho salmon in California for return season 2004/05, compared to subsequent adult returns of their progeny in return year 2007/08. The data indicated a 73 percent decline in returning adults in 2007/08 (offspring from 2004/2005 adults), compared to adult returns in 2004/2005. MacFarlane et al. (2008) speculated that because the spatial extent of the decline observed between coho parent and subsequent returning adult offspring was wide-ranging throughout California and Oregon, ocean conditions were the main causative mechanism for decline. MacFarlane et al. (2008) further supported their hypothesis with observations of low adult Chinook returns to California that as juveniles, experienced sub-optimal ocean conditions during the same time as did coho juveniles.

NMFS (2014) describes climate change impacts as detrimental to Pacific salmon through altered runoff patterns causing a precipitation shift from snow to rain, earlier snowmelt, lower summer flows, and more intense storms that will increase peak flows in freshwater. When combined with ocean acidification and large ocean processes (e.g. El Nino, Southern Oscillation), climate change is expected to reduce ocean productivity and further alter estuarine habitat as sea level rises. Warmer winter air temperatures will decrease the snowpack in northern California and southern Oregon by up to 75 percent by 2040 and nearly 100 percent by 2080 (Doppelt et al. 2008) resulting in earlier and higher high flows, and earlier and lower low flows.

Battin et al. (2007) predicted that Chinook salmon (used here as a surrogate for coho salmon) spawner capacity throughout the Pacific Northwest was proportional to minimum discharge during the spawning period; reduction trends in flow would result in reductions in spawning capacity due to habitat limitations. Widespread declines in springtime snow water equivalent have occurred in much of the North American West since the 1920s, especially since the midtwentith century (Knowles and Cayan 2004, Hamlet et al. 2005, Regonda et al. 2005, Mote 2006). These trends have resulted in earlier onsets of springtime snowmelt and stream flow across western North America (Regonda et al. 2005, Stewart et al. 2005), as well as lower flows in the summer (Stewart et al. 2005). Low flows are also important for juvenile Coho due to space and food limitations, while low flows may be associated with temperature limitations in other areas (Ebersole et al. 2009).

Past forestry practices have harvested canopy-creating trees from stream-side habitat affects cover from predation, water temperature, the watershed's ability to absorb precipitation, water flow timing, erosion, bank stability, retention of in-stream woody debris, recruitment of large woody debris, and habitat complexity. Removal of near-stream vegetation can result in increased water temperature, both short- and long-term (Moring et al. 1994, cited by CDFG 2004). The decrease in habitat complexity, loss of stream function, and loss of access to accessible off-channel habitat, and temperature refugia have contributed to reduced summer and rearing capacity for juvenile coho salmon (CDFG 2002).

Hatchery practices as a causative mechanisms of salmonid decline include hatchery straying and mixing with wild spawners where the resulting progeny exhibit lower survival then their wild stock counterparts (McGinnity et al. 2003, Kostow 2004), ultimately leading to a reduction in the reproductive success of the wild stock (Reisenbichler and McIntyre 1977, Fleming et al. 2000, Chilcote 2003, Araki et al. 2007). Flagg et al. (2000) found that, except in situations of low wild fish density, increasing releases of hatchery fish can negatively impact naturally produced fish through habitat displacement. Kostow et al. (2003) and Kostow and Zhou (2006) found that over the duration of the steelhead hatchery program on the Clackamas River, Oregon, the number of hatchery steelhead (used here as a surrogate for coho salmon) in the upper basin regularly caused the total number of steelhead to exceed carrying capacity, triggering density-dependent mechanisms that impacted the natural population. Competition between hatchery and wild salmonids in the ocean can also lead to density-dependent mechanisms that effect wild salmonid populations (Beamish et al. 1997, Levin et al. 2001, Sweeting et al. 2003), especially during periods of poor ocean productivity (Beamish et al. 1997, Levin et al. 2001, Sweeting et al. 2003).

Dam operations disrupt hydrologic signals that salmon use throughout their life history by dampening peak flows and increase low flows—the converse of climate change. Dam construction has limited, or blocked upstream migration access to spawning and rearing habitat and remains one of the single most disruptive anthropogenic factors to decline (NMFS 2014).

Critical Habitat and Physical or Biological Features for Southern Oregon Northern California Coho

Designated critical habitat for SONCC coho salmon encompasses accessible reaches of all rivers (including estuarine areas and tributaries) between the Mattole River in California and the Elk River in Oregon, inclusive (64 FR 24049). Excluded are: (1) areas above specific dams identified in the Federal Register notice; (2) areas above longstanding natural impassible barriers (i.e., natural waterfalls); and (3) tribal lands. The area described in the final rule represented the current freshwater and estuarine range of coho salmon. Land ownership patterns within the coho salmon ESU analyzed in this document and spanning southern Oregon and northern California are 53 percent private lands; 36 percent Federal lands; 10 percent State and local lands; and 1 percent Tribal lands.

The designated critical habitat for SONCC coho salmon is separated into five essential habitat types of the species' life cycle. The five essential habitat types include: (1) juvenile summer and winter rearing areas; (2) juvenile migration corridors; (3) areas for growth and development to adulthood; (4) adult migration corridors; and (5) spawning areas. Within these areas, essential features of SONCC coho salmon critical habitat include adequate: (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions (64 FR 24049).

The condition of SONCC coho salmon critical habitat at the ESU scale, specifically its ability to provide for the species' conservation, has been degraded from conditions known to support viable salmonid populations that contribute to survival and recovery of the species. NMFS determined that present depressed population conditions are, in part, the result of human-induced factors affecting critical habitat, including: intensive timber harvesting, agricultural and mining activities, urbanization, stream channelization, dams, wetland loss, and water withdrawals for irrigation. All of these factors were identified when SONCC coho salmon were listed as threatened under the ESA, and they continue to affect this ESU (NMFS 2014) However, efforts to improve coho salmon critical habitat have been widespread and are expected to benefit the ESU over time (NMFS 2014).

Within the SONCC recovery domain, from 2000 to 2006, the following improvements were completed: 242 stream miles have been treated, 31 stream miles of instream habitat were stabilized, 41 cubic feet per second of water has been returned for instream flow, and thousands of acres of upland, riparian, and wetland habitat have been treated (NMFS 2007b). Therefore, the condition of SONCC coho salmon critical habitat is likely improved or trending toward improvement compared to when it was designated in 1999.

SONCC coho salmon are dependent upon complex, low gradient habitats for winter rearing, and will express diversity by overwintering in low-gradient, off-channel and estuarine habitats when they are available. The lack of complex aquatic habitat, and much decreased access to floodplains and low gradient tributaries are common features of current critical habitat conditions within the SONCC coho salmon ESU (NMFS 2014). The Recovery Plan also describes that land use activities (e.g., timber harvest, road building, etc.) that occur upstream of low gradient streams, still affect the habitat within low gradient streams by reducing the amount of large wood and shade available and by increasing the amount of sediment that routes through the valley bottom habitats. Recovery actions include removal of or establishment of passage at dams; reducing unpermitted diversions; ensuring sufficient water quantity and quality; restoring in-channel habitat and upslope ecological function; and creating suitable estuarine nurseries.

2.2.2.3.3 Northern California Steelhead DPS Status

NC steelhead were originally defined as an ESU that included resident fish, and the anadromous fish were listed as threatened in 2000 (65 FR 36074). In 2006, NMFS redefined the NC steelhead ESU as a steelhead-only DPS (no resident fish), and reaffirmed that this DPS was a threatened species under the ESA (71 FR 834). The NC steelhead DPS comprises winter- and summer-run steelhead populations from Redwood Creek (Humboldt County) southward to, but not including, the Russian River.

Little historical abundance information exists for the naturally spawning portion of the NC steelhead DPS. A Biological Review Team (BRT) established by NMFS conducted a status review for West Coast steelhead and reported their conclusions in 1996 (Busby et al.). Although data for the NC steelhead DPS were limited, analysis by the BRT led to the following conclusions: (1) population abundances were low relative to historical estimates; (2) recent trends were downward; and (3) summer-run steelhead abundance was "very low" (Busby *et al.* 1996).

In 2003, another BRT convened to analyze updated biological information for West Coast steelhead and reported their conclusions in 2005 (Good *et al.* 2005a). Updated time series of adult abundance data suggested a downward trend in summer-run steelhead in the Middle Fork Eel River, the largest extant population of summer steelhead in the NC steelhead DPS (Good *et al.* 2005a). Similarly, analysis of new time series data for adult summer-run steelhead in the Mad River showed a downward trend.

Since publication of the 2005 status review (Good *et al.* 2005a), significant new genetic data became available for steelhead populations across much of coastal California, suggesting that changes in the DPS composition could be warranted for NC steelhead. A BRT was convened to evaluate these new data and other relevant information related to coastal steelhead DPS composition. This review was based on the existing DPS designations. As a result of the review, NMFS retained the NC steelhead DPS designation as a threatened species on April 14, 2014 (79 FR 20802).

The NC steelhead DPS includes all naturally spawning winter- and summer-run populations of *O. mykiss* (steelhead) originating below natural and manmade impassable barriers in California coastal river basins from Redwood Creek in Humboldt County, to just south of Gualala River in Mendocino County (Spence *et al.* 2008). This distribution includes the Eel River, the third largest watershed in California, with its four forks (North, Middle, South, and Van Duzen) and their extensive tributaries. The half-pounder life history also occurs within the range of this DPS, specifically in the Mad and Eel rivers. The TRT identified 29 "functionally independent", 22 "potentially independent", and at least 67 "dependent" populations in the NC steelhead DPS (Bjorkstedt *et al.* 2005); with modifications described in (Spence *et al*. 2008). Analysis of genetic data provided support for, and aided in interpretation of population type assignment (NMFS 2007b). The TRT defined five diversity strata in the NC steelhead DPS. Within three of these strata, populations were further subdivided according to life history type, with summer-run and winter-run populations constituting distinct substrata (Bjorkstedt *et al.* 2005, Spence *et al*. 2008, NMFS 2007b).

Extant summer-run steelhead populations are found in Redwood Creek and the Mad, Eel (Middle Fork) and Mattole Rivers. (Spence *et al*. 2008) concluded that adult abundance information for independent populations of steelhead in this DPS were insufficient to rigorously evaluate their viability using criteria developed by the TRT. However, the TRT concluded Bucknell Creek and Soda Creek are at a moderate/high risk of extinction based on low return counts at Van Arsdale Fish Station and the dominance of those counts by hatchery fish. The Upper Eel River was consider to be at a high risk of extinction due to the loss of habitat above Scott Dam and the high proportion of hatchery fish returning to Van Arsdale. Smaller populations including the Noyo River, Hare Creek, Pudding Creek, and Casper Creek were deemed at moderate risk of extinction if fish abundance remained unchanged over time (Spence *et al*. 2008).

The status review update conducted by the SWFSC concluded that the lack of population-level estimates of abundance for steelhead populations in this DPS continues to hinder assessment of its status (Williams *et al*. 2011a). The status review did, however, cite several concerns about the DPS including the continued depressed status of two remaining summer run populations in the DPS (Redwood Creek and Mattole River), the high number of hatchery fish in the Mad River basin, and the uncertainty about the relative abundance of hatchery and wild spawners in the Mad River. The previous status review of (Good *et al.* 2005a) concluded that the population was likely to become endangered in the foreseeable future. Based on a consideration of all new substantive information on the biological status of the DPS, the SWFSC concluded that its biological status was unchanged (Williams *et al*. 2011a). In 2016, (NMFS 2016e) completed another status review and concluded that the collective risk to the persistence of the NC steelhead DPS has not changed significantly since the 2011 review. In summary, the best available updated information on the biological status of the NC steelhead DPS and the threats it faces indicate that it continues to remain a threatened species.

Population Viability

Abundance

NC steelhead have declined throughout their range (McEwan and Jackson 1996, Busby *et al.* 1996, Good *et al.* 2005a). The highest recorded count through the Van Arsdale Fish Station was 9,528 in 1944-1945 (Harris 2015). Busby *et al.* (1996) reported an annual average of about 4,300 adult steelhead at Van Arsdale Fish Station (representing only a small fraction of entire Eel River run) from the 1930s– 1940s, and only 1,300 in the 1980s. Steelhead returns to the Van Arsdale Fish Station have been recorded for many spawning seasons, and during 2010/2011, 151 steelhead returned to the station, during 2011/2012, 296 returned, during 2012/2013, 186 returned, during 2014/2015, 217 returned, and 174 steelhead had returned during the 2015/2016 season (Friends of the Eel River 2016).

Steelhead abundance has been monitored at three other dams in the NC steelhead DPS since the 1930s: Sweasey Dam on the Mad River (annual adult average 3,800 in the 1940s), Cape Horn Dam on the upper Eel River (4,400 annual average in the 1930s), and Benbow Dam on the South Fork Eel River (18,784 annual average in the 1940s) (Murphy and Shapovalov 1951, Shapovalov and Taft 1954, Busby *et al.* 1996). These data can be compared to the annual average of 2,000 at Sweasey Dam in the 1960s, annual average at 1,000 at Cape Horn Dam in the 1980s, and annual average of 3,355 at Benbow Dam in the 1970s (McEwan and Jackson 1996, Busby *et al.* 1996). In the mid-1960s, CDFG estimated steelhead spawning in many rivers in this DPS to total about 198,000 (McEwan and Jackson 1996). Currently, the most abundant run is in the Middle Fork Eel River, with about 2,000 fish in 1996 (McEwan and Jackson 1996). Substantial declines from historic levels at major dams indicate a probable decline from historic levels at the DPS scale.

Busby *et al.* (1996) and Good *et al.* (2005a) summarized current abundance estimates, and stated that: (1) population abundances are low compared to historical estimates; (2) recent trends are downward (except for a few small summer-run populations); and (3) summer-run steelhead abundance was "very low" (Good *et al.* 2005a). The 2011 status review (Williams et al. 2011c) cited lack of data on population level abundances, particularly time series data within the DPS, as a major source of uncertainty, hindering the assessment of NC steelhead status. Population level abundance estimates were only available for 4 of the 42 independent winter-run steelhead populations and for 1 of 10 summer-run populations in the DPS. Trends for all five independent populations are negative, three of which are significant (Williams *et al*. 2011a). Of the six winter-run and three summer-run partial population estimates, trends were not calculated by NMFS because the data sets were too short (Williams *et al*. 2011a). Of the six remaining that had sufficient data, two partial populations are exhibiting significant negative trends. Only one partial population is exhibiting a significant positive trend ($p>0.05$).

Busby *et al.* (1996) and Good *et al.* (2005a) concluded that the NC steelhead DPS was not in danger of extinction, but was likely to become endangered in the foreseeable future. In the 2011 status review update, Williams et al. (2011c) found that historical and current information indicates that NC steelhead populations are depressed in basins where they are being monitored. Only the Middle Fork Eel River summer-run steelhead populations approached low-risk thresholds established by the Technical Review Team (TRT) (Williams *et al*. 2011a). The TRT also found that the summer-run population in Redwood Creek showed chronically low numbers during all surveys, suggesting that this population continues to be at a high risk of extinction (Williams *et al*. 2011a).

Land use activities associated with logging, road construction, urban development, mining, agriculture, ranching, and recreation have resulted in the loss, degradation, simplification, and fragmentation of NC steelhead habitat and caused resulting declines in NC steelhead populations (NMFS 1996). Associated impacts of these activities include: alteration of stream bank and channel morphology, alteration of ambient stream water temperatures, degradation of water quality; elimination of spawning and rearing habitats; fragmentation of available habitats; elimination of downstream recruitment of spawning gravels and LWD; removal of riparian vegetation resulting in increased stream bank erosion; and increased sedimentation input into spawning and rearing areas (NMFS 1996).

Diversity

Millions of steelhead from outside the DPS have been stocked in rivers in the NC steelhead DPS since the 1970s. Bjorkstedt *et al.* (2005) documented 39 separate releases of steelhead, many of which occurred over multiple years. Of particular concern is the practice of rearing Eel River-derived steelhead in a hatchery on the Mad River before restocking in the Eel River (Bjorkstedt *et al.* 2005). Over ten years, more than one-half million yearlings were reared and released in this way, and this practice may have reduced the effectiveness of adult homing to the Eel River (Bjorkstedt *et al.* 2005). In addition, abundance of summer-run steelhead was considered "very low" in 1996 (Good *et al.* 2005a), indicating that an important component of life history diversity in this DPS may be at risk. In the 2011 status review (Williams *et al*. 2011a), NMFS determined that the potential risks of stochastic processes associated with small population size have increased in the past five years since the previous review (Good *et al.* 2005a), likely placing populations of NC steelhead at a higher risk of extinction.

As described for SONCC coho salmon, (Spence *et al*. 2008) classified NC steelhead populations as dependent or independent based on their historic population size and ability to persist in isolation. Given the recent trends in abundance across the ESU, the genetic and life history diversity of populations is likely very low and is inadequate to contribute to a viable ESU. The most recent status review (NMFS 2016i) indicated that the biological status of the NC steelhead DPS has not changed since 2011.

Distribution

With few exceptions, NC steelhead are present wherever streams are accessible to anadromous fish and have sufficient flows. Experts consulted during the 2005 status review gave this DPS a mean risk score of 2.2 (out of 5) for the spatial structure and connectivity category (Good *et al.* 2005a), indicating it is unlikely that this factor contributes significantly to risk of extinction by itself, but there is some concern that it may, in combination with other factors.

As the 'default' historic spatial processes described by McElhany *et al*. (2000) have likely not been preserved, NMFS (Williams *et al*. 2016) concluded in the most recent status review that winter steelhead continue to inhabit most of the watersheds in which they historically occurred, thus all diversity strata within the DPS appeared to be represented by extant populations. However, given this information, there is still little information available for assessing whether conditions have improved or worsened over the past 5 years (Williams *et al*. 2016).

Although large wood features such as debris jams provide winter refuge for steelhead, cover consisting of interstitial spaces in cobble or boulder substrate is considered the key attribute defining winter habitat suitability for juvenile steelhead (Hartman 1965, Chapman and Bjornn 1969, Meyer and Griffith 1997). Hartman (1965) and Bustard and Narver (1975) found that during high winter flows, juvenile steelhead seek refuge in interstitial spaces in cobble and boulder substrates that range in size from 10 to 40+ cm (4 to 16+ in). Initial observations from experiments conducted by Redwood Sciences Laboratory and Stillwater Sciences (unpublished data; cited in Humboldt County and Stillwater Sciences 2011) in artificial stream channels, indicate that juvenile steelhead respond to high flows by seeking cover deep within cobble and boulder substrate, suggesting that steelhead will seek refuge at least 1 to 2 times the depth of the median particle size (d50) in unembedded cobble/boulder substrate.

Since publication of the 2011 status review (Williams *et al.* 2011a), population-level estimates of abundance were available for less than 10% of independent populations of winter- and summer-run NC steelhead. Since that time, data has become available for 17 independent populations, as well as six dependent populations. The available information for winter-run and summer-run populations of NC steelhead do not suggest an appreciable increase or decrease in extinction risk. Most populations for which there are population estimates available remain well below viability targets; however, the short-term increases observed for many populations, despite the occurrence of a prolonged drought in northern California, suggests this DPS is not at immediate risk of extinction (Williams *et al.* 2016).

Factors Responsible for Decline

Land use activities associated with logging, road construction, urban development, gravel mining, agriculture, ranching, and recreation have resulted in the loss, degradation, simplification, and fragmentation of habitat for steelhead in this DPS which have led to population declines. Impacts associated with these activities include: alteration of stream bank and channel morphology; alteration of ambient stream water temperatures; degradation of water quality; elimination of spawning and rearing habitats; fragmentation of available habitats; elimination of downstream recruitment of spawning gravels and large woody debris; removal of riparian vegetation resulting in increased stream bank erosion; and increased sedimentation input into spawning and rearing areas (NMFS 1996). Land use practices can exacerbate the impact of flooding, and can cause substantial degradation to steelhead habitat (Busby *et al.* 1996).

Alteration of the natural hydrology through storage, withdrawal, conveyance, and water diversions for agriculture, flood control, domestic, and hydropower purposes have reduced or eliminated historically accessible habitat for steelhead. The Scott Dam on the Eel River has eliminated access to historical spawning and rearing habitat and has altered the natural flow regime within the basin (NMFS 1996). Modification of natural flow regimes has increased water temperatures, changed fish community structures, and depleted flows. A reduction in flow volume affects fish migration, spawning, and rearing, and reduces the flushing of sediments from spawning gravels, recruitment of gravel and transport of large woody debris (NMFS 1996).

As stated in the NMFS (2015) Multispecies Recovery Plan for the NC steelhead DPS, riparian wetland habitat in California has been reduced by over 90 percent (Dahl *et al*. 1991, Platts 1990, Armour 1991 as cited in NMFS 1996). The condition of the remaining riparian, wetland, and estuarine habitats for this DPS is largely degraded and at continued risk of loss or further degradation. The destruction or modification of riparian, wetland, and estuarine areas has resulted in the loss of important rearing and migration fish habitats (Dahl 2011).

Since the original listing of this DPS, in-stream gravel mining practices have improved in Northern California. Mining operations are permitted by the Corps and the permits in place contain numerous impact minimization measures aimed at reducing the effects of gravel extraction on steelhead and their habitat. However, even with minimization measures, gravel extraction reduces overall habitat complexity and reduces the quality and quantity of available pool habitat (Simon and Hupp 1992). Given the sensitivity of channels to disturbance (*i.e.,* current lack of floodplain and channel structure; low levels of instream wood), and the use of gravel extraction reaches by steelhead for rearing, gravel extraction is a threat to rearing juveniles and a moderate threat to adults that require resting habitat in pools during upstream migration (NMFS 2015b). Increased focus should be given to addressing the potential threats to this DPS from exposure to common pesticides that may constrain recovery.

Critical Habitat and Physical or Biological Features for Northern California Steelhead

NMFS designated critical habitat for seven of the ESUs/DPSs of Pacific salmon and steelhead, including NC steelhead, in September 2005 (70 FR 52488). Specific PBFs that are essential for the conservation of each species, were identified as: freshwater spawning sites; freshwater rearing sites; freshwater migration corridors; estuarine areas; nearshore marine areas; and offshore marine areas. Within the PBFs, essential elements of NC steelhead critical habitats include adequate (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, (10) safe passage conditions, and (11) salinity conditions (70 FR 52488).

Habitat areas within the geographic range of the ESU/DPSs having these attributes and occupied by the species were considered for designation. Steelhead critical habitat was designated throughout the watersheds occupied by the ESU/DPSs. In general, the extent of critical habitat conforms to the known distribution of NC steelhead in streams, rivers, lagoons and estuaries (50 CFR 226.211). In some cases, streams containing NC steelhead were not designated because the economic benefit of exclusion outweighed the benefits of designation, as in the North Fork Eel River. Native American tribal lands and U.S. Department of Defense lands were also excluded.

Designated critical habitat for NC steelhead and CC Chinook salmon steelhead includes the stream channels up to the ordinary high-water line (50 CFR 226.211). In areas where the ordinary high-water line has not been defined pursuant to 50 CFR 226.211, the lateral extent is defined by the bankfull elevation. Critical habitat in estuaries is defined by the perimeter of the water body as displayed on standard 1:24,000 scale topographic maps or the elevation of extreme high water, whichever is greater.

Similar to the current condition of SONCC coho salmon critical habitat, the current condition of NC steelhead critical habitat is degraded throughout most of the range of this species. Estuaries and lower river habitats are greatly reduced, in both area and condition, as the valley bottoms near the mouths of rivers are where most of the agricultural and urban development is concentrated. Levees constrain most estuaries and lower rivers in this DPS and prevent access to important off-channel rearing habitat. Upstream land uses increase the amount of sediment and warm water that enters low gradient streams and decreases the availability of large wood in these habitats.

The condition of NC steelhead critical habitat, specifically its ability to provide for their conservation, is degraded from conditions known to support viable salmonid populations. NMFS determined that present depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat: logging, agricultural and mining activities, urbanization, stream channelization, dams, freshwater and estuarine wetland loss, and water withdrawals for irrigation. All of these factors were identified when NC steelhead were listed as threatened under the ESA, and they all continue to affect this DPS. However, efforts to improve NC steelhead critical habitat have been widespread and are expected to benefit the DPS.

The Multispecies Recovery Plan (NMFS 2015) for the NC steelhead identifies multiple recovery actions, including: increasing quality and extent of estuarine habitat; rehabilitating and enhancing floodplain connectivity; improving flow conditions; modifying or removing physical passage barriers; improving riparian conditions; and reducing toxicity and pollutants.

2.2.2.3.4 Eulachon Southern DPS Status

The southern DPS of eulachon was listed as threatened on March 18, 2010 (75 FR 13012). All subpopulations of eulachon within Washington, Oregon, and California are included in the listing. The DPS extends from the Skeena River in British Columbia south to the Mad River in Northern California.

Areas in California where eulachon have been documented include the Russian River, Humboldt Bay and several nearby smaller coastal rivers (e.g., Mad River), and the Klamath River. Southern DPS eulachon spawn in the lower reaches of freshwater rivers and streams but they are primarily a marine fish spending over 95 percent of their lives in the Pacific Ocean (Duran 2008). Although there have been no long-term monitoring programs for eulachon in Northern California, large spawning aggregations were reported to have once regularly occurred in the Klamath River (Reclamation 2012).

Large spawning aggregations of eulachon were reported to have once regularly occurred in the Klamath River (Fry Jr. 1979, Moyle *et. al*. 1995, Larson and Belchik 1998, Moyle 2002b, Hamilton *et al.* 2005) and on occasion in the Mad River (Moyle *et. al*. 1995, Moyle 2002b), and Redwood Creek (Moyle *et. al*. 1995); however, historical abundance and abundance trends are difficult to quantify due to the lack of a long-term eulachon monitoring program in California. Information on the populations in northern California is dependent on direct observations by Yurok tribal members and local biologists. Spawning populations were last noticed by Yurok tribal members in the late 1980s. In 1996, the Yurok Tribal Fisheries Program attempted to sample eulachon run in the lower Klamath River using dip nets and electrofishing methods, totaling 110 hours of survey time between early February and early May. No eulachon were captured (Duran 2008). These observations mirror data for this species range-wide, indicating that the species has experienced a period of low abundance for more than 20 years (NMFS 2014c). While eulachon have declined substantially in the Klamath River, they have not been totally absent from this area in recent years. In particular, recent reports from Yurok Tribal Fisheries biologists of a few eulachon being caught incidentally in other fisheries on the Klamath in 2007 indicates eulachon still enter the Klamath River in low numbers (75 FR 13012). In the most recent status review, NMFS indicates that the Klamath River has seen a positive increase of adult eulachon presence in the 2011-2014 spawning seasons (NMFS 2016a).

Threats

Eulachon are affected by habitat loss due to hydroelectric dams that block access to historical eulachon spawning grounds, affect the quality of spawning substrates through flow management, and alter delivery of coarse sediments. Flows at spawning areas may also be affected by upstream water diversions (USACE 2010). Eulachon mortality is impacted by habitat degradation due to dredging, industrial and agricultural pollution, shoreline development, and forestry occurring at local scales and between spawning rivers. However, it is unlikely that such threats would explain the nearly synchronous coast-wide decline that has occurred (USACE 2010).

Eulachon have been shown to carry high levels of chemical pollutants. Although, it has not been demonstrated that high-contaminant loads in eulachon result in increased mortality or reduced reproductive success, such effects have been shown in other fish species (NMFS 2014c).

In addition to general threats to Southern DPS eulachon mentioned above, a qualitative ranking by the Eulachon Biological Review Team of the severity of threats for Klamath River eulachon are identified and listed as follows: climate change impacts on ocean conditions, dams/water diversion, eulachon bycatch, climate change impacts on freshwater habitat, predation, water quality, competition, catastrophic events, disease, shoreline construction, Tribal First/Nations Fisheries, nonnative species, and recreational harvest (Gustafson *et al*. 2010).

There is much uncertainty in our knowledge regarding how threats influence eulachon. There is actually more that is not known about the sDPS of eulachon than is known. These uncertainties present a challenge in developing quantifiable parameters (e.g., life-cycle models and population viability analysis) that would indicate when eulachon are viable, self-sufficient, and no longer in danger of extinction or likely to become endangered in the foreseeable future. As such, the Recovery Plan for the sDPS of eulachon (NMFS 2017) outlines multiple actions to address the knowledge gaps that we have. Some of these include developing a research, monitoring, evaluation, and adaptive management plan; establishing near-term research priorities; establishing a Eulachon Technical Recovery and Implementation Team; and implementing outreach and education strategies.

Critical Habitat and Physical or Biological Features for Eulachon Southern Distinct Population Segment

Critical habitat was designated for the Southern DPS eulachon on October 20, 2011 (76 FR 65324). In developing the critical habitat designation, NMFS developed a list of Physical Biological Features that are essential to the conservation of the Pacific eulachon, including: (1) freshwater spawning and incubation sites with water flow, quality, and temperature conditions, and substrate supporting spawning and incubation; and (2) freshwater and estuarine migration corridors free of obstruction, supporting larval and adult mobility, and with abundant prey items for larval stage. A comprehensive list of waterways designated as critical habitat for this DPS can be found in the Federal Register (76 FR 65324).

2.2.2.4 California Central Valley

2.2.2.4.1 Sacramento River Winter-run Chinook Salmon ESU Status

The Sacramento River winter-run Chinook salmon ESU, currently listed as endangered, was listed as a threatened species under emergency provisions of the Endangered Species Act (ESA) on August 4, 1989 (54 FR 32085), and was listed as a threatened species in a final rule on November 5, 1990 (55 FR 46515). On January 4, 1994, NMFS re-classified winter-run Chinook salmon as an endangered species (59 FR 440). NMFS concluded that winter-run Chinook salmon in the Sacramento River warranted listing as an endangered species due to several factors, including the following:

- The continued decline and increased variability of run sizes since its first listing as a threatened species in 1989
- The expectation of weak returns in future years as the result of two small year classes (1991 and 1993)
- Continued threats to winter-run Chinook salmon (59 FR 440; January 4, 1994)

Historically, Sacramento River winter-run Chinook salmon population estimates were as high as 120,000 fish in the 1960s, but declined to less than 200 fish by the 1990s (NMFS 2011b). In recent years, since carcass surveys began in 2001, the highest adult escapement occurred in 2005 and 2006 with 15,839 and 17,296, respectively (CDFG 2012). However, from 2007 to 2013, the population has shown a precipitous decline, averaging 2,486 during this period, with a low of 827 adults in 2011 (CDFG 2012). This recent declining trend is likely due to a combination of factors such as poor ocean productivity (Lindley *et al.* 2009), drought conditions from 2007 to 2009, and low in-river survival rates (NMFS 2011b). In 2014 and 2015, the population was approximately 3,000 adults, slightly above the 2007 to 2012 average, but below the high (17,296) for the last 10 years (NMFS 2016h).

The year 2014 was the third year of a drought that increased water temperatures in the upper Sacramento River, and egg-to-fry survival to the Red Bluff Diversion Dam (RBDD) was approximately 5 percent (NMFS 2016h). Due to the anticipated lower than average survival in 2014, hatchery production from Livingston Stone National Fish Hatchery (LSNFH) was tripled (i.e., 612,056 released) to offset the impact of the drought (CVP and SWP Drought Contingency Plan 2015). In 2014, hatchery production represented 83 percent of the total in-river juvenile production. In 2015, egg-to-fry survival was the lowest on record (approximately 4 percent) due to the inability to release cold water from Shasta Dam in the fourth year of a drought. As expected, winter-run Chinook salmon returns in 2016 were a low, as they show the impact of 1,546 (CDFW 2017) due to drought impacts on juveniles from brood year 2013 (NMFS 2016g).

Although impacts from hatchery fish (i.e., reduced fitness, weaker genetics, smaller size, less ability to avoid predators) are often cited as having deleterious impacts on natural in-river populations (Matala *et al.* 2012), the winter-run Chinook salmon conservation program at LSNFH is strictly controlled by the USFWS to reduce such impacts. The average annual hatchery production at LSNFH is approximately 176,348 per year (2001 to 2010 average) compared to the estimated natural production that passes RBDD, which is 4.7 million per year based on the 2002 to 2010 average (Poytress and Carrillo 2011). Therefore, hatchery production typically represents approximately 3 to 4 percent of the total in-river juvenile winter-run production in any given year. However, the average over the last 12 years (about four generations) is 13 percent, with the most recent generation at 20 percent hatchery influence, making the population at a moderate risk of extinction.

The distribution of winter-run spawning and initial rearing historically was limited to the upper Sacramento River (upstream of Shasta Dam), McCloud River, Pitt River, and Battle Creek, where springs provided cold water throughout the summer, allowing for spawning, egg incubation, and rearing during the mid-summer period (Yoshiyama *et al.* 1998). The construction of Shasta Dam in 1943 blocked access to all of these waters except Battle Creek, which currently has its own impediments to upstream migration (i.e., a number of small hydroelectric dams situated upstream of the Coleman National Fish Hatchery (CNFH) weir). The Battle Creek Salmon and Steelhead Restoration Project (BCSSRP) is currently removing these impediments, restoring spawning and rearing habitat suitable for winter-run Chinook salmon in Battle Creek, which will be reintroduced to establish an additional population. Approximately 299 miles of former tributary spawning habitat above Shasta Dam are inaccessible to winter-run Chinook salmon. Yoshiyama *et al.* (2001) estimated that in 1938, the upper Sacramento River had a "potential spawning capacity" of approximately 14,000 redds equal to 28,000 spawners. Since

2001, the majority of winter-run chinook salmon redds have occurred in the first 10 miles downstream of Keswick Dam. Most components of the winter-run Chinook salmon life history (e.g., spawning, incubation, freshwater rearing) have been compromised by the construction of Shasta Dam.

The greatest risk factor for winter-run Chinook salmon lies within its spatial structure (NMFS 2011b). The winter-run Chinook salmon ESU is comprised of only one population that spawns below Keswick Dam. The remnant and remaining population cannot access 95 percent of their historical spawning habitat and must therefore be artificially maintained in the upper Sacramento River by spawning gravel augmentation, hatchery supplementation, and regulation of the finite cold water pool behind Shasta Dam to reduce water temperatures.

Winter-run Chinook salmon require cold water temperatures in the summer that simulate their upper basin habitat, and they are more likely to be exposed to the impacts of drought in a lower basin environment. Battle Creek is currently the most feasible opportunity for the ESU to expand its spatial structure, but restoration is not scheduled to be completed until 2020. The Central Valley Salmon and Steelhead Recovery Plan (Recovery Plan) includes criteria for recovering the winter-run Chinook salmon ESU, including re-establishing a population into historical habitats in Battle Creek as well as upstream of Shasta Dam (NMFS 2014).

Winter-run Chinook salmon embryonic and larval life stages that are most vulnerable to warmer water temperatures occur during the summer, which makes the species particularly at risk from climate warming. The only remaining population of winter-run Chinook salmon relies on the cold water pool in Shasta Reservoir, which buffers the effects of warm temperatures in most years. The exception occurs during drought years, which are predicted to occur more often with climate change (Yates *et al*. 2008). The long-term projection of how the Central Valley Project (CVP) and State Water Project (SWP) will operate incorporates the effects of climate change in three possible forms: less total precipitation; a shift to more precipitation in the form of rain rather than snow; or, earlier spring snow melt (Reclamation 2008). Additionally, air temperature appears to be increasing at a greater rate than what was previously analyzed (Lindley *et. al*. 2008, Beechie *et al*. 2012, Dimacali 2013). These factors will compromise the quantity and/or quality of winter-run Chinook salmon habitat available downstream of Keswick Dam. It is imperative for additional populations of winter-run Chinook salmon to be re-established into historical habitat in Battle Creek and above Shasta Dam for long-term viability of the ESU (NMFS 2014a).

Sacramento River Winter-run Chinook Salmon Evolutionarily Significant Unit Viability

There are several criteria that would qualify the winter-run Chinook salmon population at moderate risk of extinction (continued low abundance, a negative growth rate over two complete generations, significant rate of decline since 2006, increased hatchery influence on the population, and increased risk of catastrophe), and because there is still only one population that spawns below Keswick Dam, the Sacramento River winter-run Chinook salmon ESU is at a high risk of extinction in the long term. The extinction risk for the winter-run Chinook salmon ESU has increased from moderate risk to high risk of extinction since 2005, and several listing factors have contributed to the recent decline, including drought, poor ocean conditions, and hatchery influence (NMFS 2016h). Thus, large-scale fish passage and habitat restoration actions are necessary for improving the winter-run Chinook salmon ESU viability (NMFS 2016h).

Critical Habitat and Physical or Biological Features for Sacramento River Winter-run Chinook Salmon

The critical habitat designation for Sacramento River winter-run Chinook salmon lists the PBFs (58 FR 33212). This designation includes the following waterways, bottom and water of the waterways, and adjacent riparian zones: the Sacramento River from Keswick Dam (river mile (RM) 302) to Chipps Island (RM 0) at the westward margin of the Delta; all waters from Chipps Island westward to the Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and the Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay north of the San Francisco-Oakland Bay Bridge from San Pablo Bay to the Golden Gate Bridge (58 FR 33212). NMFS clarified that “adjacent riparian zones” are limited to only those areas above a stream bank that provide cover and shade to the nearshore aquatic areas (58 FR 33212). Although the bypasses (e.g., Yolo, Sutter, and Colusa) are not currently designated critical habitat for winter-run Chinook salmon, NMFS recognizes that they may be utilized when inundated with Sacramento River flood flows and are important rearing habitats for juvenile winter-run. Also, juvenile winter-run Chinook salmon may use tributaries of the Sacramento River for non-natal rearing (Maslin 1997, Pacific States Marine FIsheries Commission 2014).

Currently, many of the PBFs of winter-run Chinook salmon critical habitat are degraded and provide limited high quality habitat. Factors that lessen the quality of migratory corridors for juveniles include unscreened diversions, altered flows in the Delta, and the lack of floodplain habitat. In addition, water operations that limit the extent of cold water below Shasta Dam have reduced the available spawning habitat (based on water temperature). Although the current conditions of winter-run Chinook salmon critical habitat are significantly degraded, the spawning habitat, migratory corridors, and rearing habitat that remain are considered to have high intrinsic value for the conservation of the species.

2.2.2.4.2 Central Valley Spring-run Chinook Salmon Status

CV spring-run Chinook salmon were originally listed as threatened on September 16, 1999 (64 FR 50394). This ESU consists of naturally spawned spring-run Chinook salmon originating from the Sacramento River basin. The Feather River Fish Hatchery (FRFH) spring-run Chinook salmon population has been included as part of the CV spring-run Chinook salmon ESU in the most recent CV spring-run Chinook salmon listing decision (70 FR 37160; June 28, 2005). Although the FRFH spring-run Chinook salmon program is included in the ESU, the take prohibitions in 50 CFR 223.203 do not apply to these fish because they do not have an intact adipose-fin. Critical habitat was designated for CV spring-run Chinook salmon on September 2, 2005 (70 FR 52488).

Historically, CV spring-run Chinook salmon were the second most abundant salmon run in the Central Valley and one of the largest on the west coast (CDFG 1990). These fish occupied the upper and middle elevation reaches (1,000 to 6,000 feet) of the San Joaquin, American, Yuba, Feather, Sacramento, McCloud and Pit rivers, with smaller populations in most tributaries with sufficient habitat for over-summering adults (Stone 1874), (Rutter 1904), (Clark 1929). The Central Valley drainage as a whole is estimated to have supported CV spring-run Chinook salmon runs as large as 600,000 fish between the late 1880s and 1940s (CDFG 1998). The San Joaquin River historically supported a large run of CV spring-run Chinook salmon, suggested to be one of the largest runs of any Chinook salmon on the West Coast, with estimates averaging 200,000 to 500,000 adults returning annually (CDFG 1990).

Monitoring of the Sacramento River mainstem during CV spring-run Chinook salmon spawning timing indicates some spawning occurs in the river (CDFW 2014). Genetic introgression has likely occurred here due to lack of physical separation between spring-run and fall-run Chinook salmon populations (CDFG 1998). Battle Creek and the upper Sacramento River represent persisting populations of CV spring-run Chinook salmon in the basalt and porous lava diversity group, though numbers remain low. Other Sacramento River tributary populations in Mill, Deer, and Butte creeks are likely the best trend indicators for the CV spring-run Chinook salmon ESU. Generally, these streams showed a positive escapement trend between 1991 and 2006, displaying broad fluctuations in adult abundance. The Feather River Fish Hatchery (FRFH) CV spring-run Chinook salmon population represents an evolutionary legacy of populations that once spawned above Oroville Dam. The FRFH population is included in the ESU based on its genetic linkage to the natural spawning population and the potential for development of a conservation strategy (70 FR 37160).

The Central Valley Technical Review Team (TRT) estimated that historically there were 18 or 19 independent populations of CV spring-run Chinook salmon, along with a number of dependent populations, all within four distinct geographic regions (i.e., diversity groups) (Lindley *et al.* 2004). Of these populations, only three independent populations currently exist (Mill, Deer, and Butte creeks tributary to the upper Sacramento River), and they represent only the northern Sierra Nevada diversity group. Additionally, smaller populations are currently persisting in Antelope and Big Chico creeks and the Feather and Yuba rivers in the northern Sierra Nevada diversity group (CDFG 1998). The northwestern California diversity group has two low abundance persisting populations of spring-run in Clear and Beegum creeks. In the San Joaquin River basin, the southern Sierra Nevada diversity group, observations in the last decade suggest that spring-running populations may currently occur in the Stanislaus and Tuolumne rivers (Franks 2015).

The CV spring-run Chinook salmon ESU is comprised of two known genetic complexes. Analysis of natural and hatchery spring-run Chinook salmon stocks in the Central Valley indicates that the northern Sierra Nevada diversity group spring-run Chinook salmon populations in Mill, Deer, and Butte creeks retain genetic integrity as opposed to the genetic integrity of the Feather River population, which has been somewhat compromised by introgression with the fall-run ESU (Good *et al.* 2005a, Garza and Pearse 2008, Cavallo et al. 2009).

Because the populations in Butte, Deer and Mill creeks are the best trend indicators for ESU viability, NMFS can evaluate risk of extinction based on VSP in these watersheds. Over the long term, these three remaining populations are considered to be vulnerable to anthropomorphic and naturally occurring catastrophic events. The viability assessment of CV spring-run Chinook salmon, conducted during NMFS’ 2010 status review (NMFS 2011b), found that the biological status of the ESU had worsened since the status review in 2005, and the status review recommends that the species status be reassessed in 2 to 3 years as opposed to waiting another 5 years if the decreasing trend continued. In 2012 and 2013, most tributary populations increased in returning adults, averaging more than 13,000. However, 2014 returns were lower again—approximately 5,000 fish—indicating the ESU remains highly fluctuating. The most recent status review was conducted in 2015 (NMFS 2016h), and it looked at promising increasing populations in 2012 to 2014; however, the 2015 returning fish were extremely low (1,488), with additional pre-spawn mortality reaching record lows. Since the effects of the 2012 to 2015 drought have not been fully realized, NMFS anticipates at least several more years of very low returns, which may result in severe rates of decline (NMFS 2016h).

Spring-run Chinook salmon adults are vulnerable to climate change because they over-summer in freshwater streams before spawning in autumn (Thompson *et al.* 2011). CV spring-run Chinook salmon spawn primarily in the tributaries to the Sacramento River, and those tributaries without cold water refugia (usually input from springs) will be more susceptible to impacts of climate change. Even in tributaries with cool water springs, in years of extended drought and warming water temperatures, unsuitable conditions may occur. Additionally, juveniles often rear in the natal stream for one to two summers prior to emigrating, and they would be susceptible to warming water temperatures. In Butte Creek, fish are limited to low elevation habitat that is currently thermally marginal, as demonstrated by high summer mortality of adults in 2002, 2003, and 2015, and will become intolerable within decades if the climate warms as expected. Ceasing water diversion for power production from the summer holding reach in Butte Creek resulted in cooler water temperatures, more adults surviving to spawn, and extended population survival time (Mosser *et al*. 2013).

The NMFS Recovery Plan (2014), that includes CV spring-run Chinook salmon, CV winter-run salmon, and CV steelhead, identifies recovery goals that focus on addressing several key stressors that are vital to CV spring-run Chinook salmon. These include: (1) elevated water temperatures affecting adult migration and holding; (2) low flows and poor fish passage facilities, affecting attraction and migratory cues of migrating adults; and (3) possible catastrophic events (NMFS 2014).

Critical Habitat and Physical or Biological Features for Central Valley Spring-run Chinook Salmon

The critical habitat designation for CV spring-run Chinook salmon lists the PBFs (70 FR 52488). The PBFs include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, and estuarine habitat. The geographical range of designated critical habitat includes stream reaches of the Sacramento, Feather, Yuba, and American rivers; Big Chico, Butte, Deer, Mill, Battle, Antelope, and Clear creeks; and the Sacramento River as well as portions of the northern Delta (70 FR 52488).

Currently, many of the PBFs of CV spring-run Chinook salmon critical habitat are degraded and provide limited high quality habitat. Factors that lessen the quality of migratory corridors for juveniles include unscreened or inadequately screened diversions, altered flows in the Delta, scarcity of complex in-river cover, and the lack of floodplain habitat. Although the current conditions of CV spring-run Chinook salmon critical habitat are significantly degraded, the spawning habitat, migratory corridors, and rearing habitat that remain are considered to have high intrinsic value for the conservation of the species.

2.2.2.4.3 California Central Valley Steelhead Status

CCV steelhead were originally listed as threatened on March 19, 1998 (63 FR 13347). Following a status review (Good et al. 2005) and after application of the agency's hatchery listing policy, NMFS reaffirmed the status of CCV steelhead as threatened and also listed the FRFH and Coleman NFH artificial propagation programs as part of the DPS on January 5, 2006 (71 FR 834). In doing so, NMFS applied the DPS policy to the species because the resident and anadromous life forms of steelhead remain "markedly separated" as a consequence of physical, ecological, and behavioral factors, and may therefore warrant delineation as separate DPSs (71 FR 834; January 5, 2006). On May 5, 2016, NMFS completed another 5-year status review of CCV steelhead and recommended that the CCV steelhead DPS remain classified as a threatened species (NMFS 2016c). Critical habitat was designated for CCV steelhead on September 2, 2005 (70 FR 52488).

Historic CCV steelhead run sizes are difficult to estimate given the paucity of data, but may have approached one to two million adults annually (McEwan 2001b). By the early 1960s, the CCV steelhead run size had declined to about 40,000 adults (McEwan 2001b). Current abundance data for CCV steelhead are limited to returns to hatcheries and redd surveys conducted on a few rivers. The hatchery data are the most reliable because redd surveys for steelhead are often made difficult by high flows and turbid water usually present during the winter-spring spawning period.

CCV steelhead returns to CNFH increased from 2011 to 2014. After hitting a low of only 790 fish in 2010, 2013 and 2014 have averaged 2,895 fish. Wild adults counted at the hatchery each year represent a small fraction of overall returns, but their numbers have remained relatively steady, typically 200 to 300 fish each year. Numbers of wild adults returning each year ranged from 252 to 610 from 2010 to 2014, respectively.

Redd counts are conducted in the American River and in Clear Creek (Shasta County). An average of 143 redds have been counted on the American River from 2002 to 2015 (data from (Hannon *et al.* 2003)). An average of 178 redds have been counted in Clear Creek from 2001 to 2015 following the removal of Saeltzer Dam, which allowed steelhead access to additional spawning habitat. The Clear Creek redd count data ranges from 100 to 1,023 and indicates an upward trend in abundance since 2006 (USFWS 2015).

The returns of CCV steelhead to the FRFH experienced a sharp decrease from 2003 to 2010, with only 679, 312, and 86 fish returning in 2008, 2009 and 2010, respectively. In recent years, however, returns have experienced an increase, with 830, 1,797, and 1,505 fish returning in 2012, 2013, and 2014, respectively. Overall, steelhead returns to hatcheries have fluctuated so much from 2001 to 2015 that no clear trend is present.

An estimated 100,000 to 300,000 naturally produced juvenile steelhead are estimated to leave the Central Valley annually, based on rough calculations from sporadic catches in trawl gear (Good *et al.* 2005b). Nobriga and Cadrett (2001) used the ratio of adipose fin-clipped (hatchery) to unclipped (wild) steelhead smolt catch ratios in the USFWS Chipps Island trawl from 1998 through 2000 to estimate that about 400,000 to 700,000 steelhead smolts are produced naturally each year in the Central Valley. Trawl data indicate that the level of natural production of steelhead has remained very low since the 2011 status review, suggesting a decline in natural production based on consistent hatchery releases. Catches of steelhead at the fish collection facilities in the southern Delta are another source of information on the production of wild steelhead relative to hatchery steelhead. The overall catch of steelhead has declined dramatically since the early 2000s, with an overall average of 2,705 in the last 10 years. The percentage of wild (unclipped) fish in salvage has fluctuated, but has leveled off to an average of 36 percent since a high of 93 percent in 1999.

About 80 percent of the historical spawning and rearing habitat once used by CCV steelhead in the Central Valley is now upstream of impassible dams (Lindley *et al.* 2006). Many historical populations of CCV steelhead are entirely above impassable barriers and may persist as resident or adfluvial rainbow trout, although they are presently not considered part of the DPS. Steelhead are well-distributed throughout the Central Valley below the major rim dams (Good *et al.* 2005a, NMFS 2016h). Most of the steelhead populations in the Central Valley have a high hatchery component, including Battle Creek (adults intercepted at the CNFH weir), the American River, Feather River, and Mokelumne River.

The CCV steelhead abundance and growth rates continue to decline, largely the result of a significant reduction in the amount and diversity of habitats available to these populations (Lindley *et al.* 2006). Recent reductions in population size are supported by genetic analysis (Nielsen *et al.* 2003). Garza and Pearse (2008) analyzed the genetic relationships among CCV steelhead populations and found that unlike the situation in coastal California watersheds, fish below barriers in the Central Valley were often more closely related to below barrier fish from other watersheds than to *O. mykiss* above barriers in the same watershed. This pattern suggests the ancestral genetic structure is still relatively intact above barriers, but may have been altered below barriers by stock transfers. The genetic diversity of CCV steelhead is also compromised by hatchery origin fish, placing the natural population at a high risk of extinction (Lindley *et al.* 2007b). Steelhead in the Central Valley historically consisted of both summer-run and winter-run Chinook salmon migratory forms. Only winter-run (ocean maturing) steelhead currently are found in California Central Valley rivers and streams as summer-run have been extirpated (McEwan and Jackson 1996, Moyle 2002b).

Although CCV steelhead will experience similar effects of climate change to Chinook salmon in the Central Valley, as they are also blocked from the vast majority of their historic spawning and rearing habitat, the effects may be even greater in some cases, as juvenile steelhead need to rear in the stream for one to two summers prior to emigrating as smolts. In the Central Valley, summer and fall temperatures below the dams in many streams already exceed the recommended temperatures for optimal growth of juvenile steelhead, which range from 57°F to 66°F (14°C to 19°C). Several studies have found that steelhead require colder water temperatures for spawning and embryo incubation than salmon (McCullough *et al.* 2001). In fact, McCullough *et al.* (2001) recommended an optimal incubation temperature at or below 52°F to 55°F (11°C to 13°C). Successful smoltification in steelhead may be impaired by temperatures above 54°F (12°C), as reported in (Richter and Kolmes 2005). As stream temperatures warm due to climate change, the growth rates of juvenile steelhead could increase in some systems that are currently relatively cold, but potentially at the expense of decreased survival due to higher metabolic demands and greater presence and activity of predators. Stream temperatures that are currently marginal for spawning and rearing may become too warm to support wild steelhead populations.

Critical Habitat and Physical or Biological Features for California Central Valley Steelhead

The critical habitat designation for CCV steelhead lists the PBFs (70 FR 52488; September 2, 2005). The PBFs include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, and estuarine areas. The geographical extent of designated critical habitat includes the following: the Sacramento, Feather, and Yuba rivers and the Deer, Mill, Battle, and Antelope creeks in the Sacramento River basin; the San Joaquin River, including its tributaries but excluding the mainstem San Joaquin River above the Merced River confluence; and the waterways of the Delta.

Many of the PBFs of CCV steelhead critical habitat are degraded and provide limited high quality habitat. Passage to historical spawning and juvenile rearing habitat has been largely reduced due to construction of dams throughout the Central Valley. Levee construction has also degraded the freshwater rearing and migration habitat and estuarine areas as riparian vegetation has been removed, reducing habitat complexity and food resources and resulting in many other ecological effects. Contaminant loading and poor water quality in central California waterways pose threats to lotic fish, their habitat, and food resources. Additionally, due to reduced access to historical habitats, genetic introgression is occurring because naturally produced fish are interacting with hatchery-produced fish, which has the potential to reduce the long-term fitness and survival of this species.

Although the current conditions of CCV steelhead critical habitat are significantly degraded, the spawning habitat, migratory corridors, and rearing habitat that remain in the Sacramento-San Joaquin River watersheds and the Delta are considered to have high intrinsic value for the conservation of the species as they are critical to ongoing recovery efforts. Recovery efforts focus on addressing several key stressors that are vital to CV steelhead. These include: (1) elevated water temperatures affecting adult migration and holding; (2) low flows and poor fish passage facilities, affecting attraction and migratory cues of migrating adults; and (3) possible catastrophic events (NMFS 2014).

2.2.2.4.4 Southern Distinct Population Segment of North American Green Sturgeon Status

In June of 2001, NMFS received a petition to list green sturgeon and designate their critical habitat under the ESA. After completion of a status review (Adams et al. 2002), NMFS found that the species was comprised of two DPSs that qualify as species under the ESA, but that neither DPS warranted listing (68 FR 4433; January 29, 2003). Several entities challenged our determination that listing was not warranted in Federal district court, and the court issued an order setting aside and remanding our determination. Following a status review update in 2005, NMFS listed the sDPS as threatened based on the reduction of potential spawning habitat, the severe threats to the single remaining spawning population (in the Sacramento River), the inability to alleviate these threats with the conservation measures in place, and the decrease in observed numbers of juvenile green sturgeon collected in the past two decades before listing compared to those collected historically (71 FR 17757; April 7, 2006). Since the 2006 listing decision, new information has become available regarding the many threats to the species from entrainment, flow operations, reservoir operations, habitat loss, water quality, toxics, invasive species, and population dynamics, reaffirming NMFS' concerns that sDPS green sturgeon face substantial threats to their viability and recovery (Israel and Klimley 2008).

Green sturgeon are known to range from Baja California to the Bering Sea along the North American continental shelf. During late summer and early fall, subadults and non-spawning adult green sturgeon can frequently be found aggregating in estuaries along the Pacific coast (Emmett *et al.* 1991, Moser and Lindley 2006). Using polyploid microsatellite data, Israel *et al.* (2009b) found that green sturgeon within the Central Valley of California belong to the sDPS. Additionally, acoustic tagging studies have found that green sturgeon found spawning within the Sacramento River are exclusively sDPS green sturgeon (Lindley *et al.* 2011). In waters inland from the Golden Gate Bridge in California, sDPS green sturgeon are known to range through the estuary and the Delta and up the Sacramento, Feather, and Yuba rivers (Seesholtz *et al.* 2014, Israel *et al*. 2009a, Bergman *et al.* 2011). It is unlikely that green sturgeon utilize areas of the San Joaquin River upriver of the Delta with regularity, and spawning events are thought to be limited to the upper Sacramento River and its tributaries. There is no known modern usage of the upper San Joaquin River by green sturgeon, and adult spawning has not been documented there (Jackson and Eenennaam 2012).

Recent research indicates that the sDPS is composed of a single, independent population, which principally spawns in the upper mainstem Sacramento River and also breeds opportunistically in the Feather River and possibly the Yuba River (Bergman *et al.* 2011, Seesholtz *et al.* 2014). Concentration of adults into a very few select spawning locations makes the species highly vulnerable to poaching and catastrophic events. The apparent, but unconfirmed, extirpation of spawning populations from the San Joaquin River narrows the available habitat within their range, offering fewer habitat alternatives. Whether sDPS green sturgeon display diverse phenotypic traits, such as ocean behavior, age at maturity, and fecundity, or if there is sufficient diversity to buffer against long-term extinction risk is not well understood. It is likely that the diversity of sDPS green sturgeon is low, given recent abundance estimates (NMFS 2015c).

Trends in abundance of sDPS green sturgeon have been estimated from two long-term data sources: (1) salvage numbers at the state and Federal pumping facilities (CDFW 2017), and (2) by incidental catch of green sturgeon by the CDFW's white sturgeon sampling/tagging program (Dubois and Harris 2015, 2016). Historical estimates from these sources are likely unreliable because the sDPS was likely not taken into account in incidental catch data, and salvage does not capture rangewide abundance in all water year types. A decrease in sDPS green sturgeon abundance has been inferred from the amount of take observed at the south Delta pumping facilities, the Skinner Delta Fish Protection Facility (SDFPF), and the Tracy Fish Collection Facility (TFCF). This data should be interpreted with some caution. Operations and practices at the facilities have changed over the project lifetime, which may affect salvage data. These data likely indicate a high production year versus a low production year qualitatively, but cannot be used to rigorously quantify abundance.

Since 2010, more robust estimates of sDPS green sturgeon have been generated. As part of a doctoral thesis at the University of California at Davis (UC Davis), Ethan Mora has been using acoustic telemetry to locate green sturgeon in the Sacramento River and to derive an adult spawner abundance estimate (Mora *et al*. 2015). Preliminary results of these surveys estimate an average annual spawning run of 223 (using dual-frequency identification sonar (DIDSON) and 236 (using telemetry) fish. This estimate does not include the number of spawning adults in the lower Feather or Yuba rivers, where green sturgeon spawning was recently confirmed (Seesholtz *et al.* 2014).

The parameters of green sturgeon population growth rate and carrying capacity in the Sacramento Basin are poorly understood. Larval count data shows enormous variance among sampling years. In general, sDPS green sturgeon year class strength appears to be highly variable with overall abundance dependent upon a few successful spawning events (NMFS 2010a). Other indicators of productivity such as data for cohort replacement ratios and spawner abundance trends are not currently available for sDPS green sturgeon.

The sDPS green sturgeon spawn primarily in the Sacramento River in the spring and summer. The Anderson-Cottonwood Irrigation District Diversion Dam (ACID) is considered the upriver extent of green sturgeon passage in the Sacramento River (71 FR 17757). The upriver extent of green sturgeon spawning, however, is approximately 30 kilometers downriver of ACID where water temperature is higher than ACID during late spring and summer (Heublein *et al.* in review). Thus, if water temperatures increase with climate change, temperatures adjacent to ACID may remain within tolerable levels for the embryonic and larval life stages of green sturgeon, but temperatures at spawning locations lower in the river may be more affected. It is uncertain, however, if green sturgeon spawning habitat exists closer to ACID, which could allow spawning to shift upstream in response to climate change effects. Successful spawning of green sturgeon in other accessible habitats in the Central Valley (i.e., the Feather River) is limited, in part, by late spring and summer water temperatures (NMFS 2015c). Similar to salmonids in the Central Valley, green sturgeon spawning in tributaries to the Sacramento River is likely to be further limited if water temperatures increase and higher elevation habitats remain inaccessible.

Critical Habitat and Physical or Biological Features for Southern Distinct Population Segment Green Sturgeon

The critical habitat designation for sDPS green sturgeon lists PBFs (74 FR 52300). In summary, the PBFs include the following for both freshwater riverine systems and estuarine habitats: Food resources, water flow, water quality, migratory corridor, depth, and sediment quality. Additionally, substrate type or size is also a PBF for freshwater riverine systems. In addition, the PBFs include migratory corridor, water quality, and food resources in nearshore coastal marine areas. The geographical range of designated critical habitat includes the following:

- In freshwater, the geographical range includes:
    - The Sacramento River from the Sacramento I-Street bridge to Keswick Dam, including the Sutter and Yolo bypasses and the lower American River from the confluence with the mainstem Sacramento River upstream to the highway 160 bridge
    - The Feather River from its confluence with the Sacramento River upstream to Fish Barrier Dam

  - The Yuba River from its confluence with the Feather River upstream to Daguerre Point Dam
  - The Delta (as defined by California Water Code section 12220, except for listed excluded areas)

- In coastal bays and estuaries, the geographical range includes:

  - San Francisco, San Pablo, Suisun, and Humboldt bays in California
  - Coos, Winchester, Yaquina, and Nehalem bays in Oregon
  - Willapa Bay and Grays Harbor in Washington
  - the lower Columbia River estuary from the mouth to river kilometer (RK) 74

In coastal marine waters, the geographical range includes all United States coastal marine waters out to the 60-fathom-depth bathymetry line from Monterey Bay north and east to include waters in the Strait of Juan de Fuca, Washington.

Currently, many of the PBFs of sDPS green sturgeon are degraded and provide limited high quality habitat. Factors that lessen the quality of migratory corridors for juveniles include unscreened or inadequately screened diversions, altered flows in the Delta, and presence of contaminants in sediment. Although the current conditions of green sturgeon critical habitat are significantly degraded, the spawning habitat, migratory corridors, and rearing habitat that remain in both the Sacramento-San Joaquin River watersheds, the Delta, and nearshore coastal areas are considered to have high intrinsic value for the conservation of the species.

2.2.2.5 Climate Change

The best available scientific information indicates the accumulation of greenhouse gasses in the atmosphere is driving climate warming (IPCC 2007). The general physical effects of climate change include, but are not limited to: (1) sea level rise; (2) ocean acidification; (3) increased number of wildfires; (4) increases in water temperature in the ocean, rivers, and streams; (5) alterations in stream morphology, (6) increased droughts; and (7) modification of a variety of watershed processes such as run-off, erosion, and sedimentation. Coupled with naturally stressful conditions that occur during critical life stages, climate-related stressors are likely to affect the rangewide status of the species.

Environmental monitoring data in the southwestern United States indicate changes in climatic trends have the potential to affect species life history strategies and habitat requirements. The southwest U.S. average annual temperature is projected to rise approximately 4° F to 10° F over the region by the end of the century (USGRCP 2009). Central California has shown trends toward warmer winters since the 1940s (Dettinger and Cayan 1995). Southern California is also experiencing an increasing trend in droughts, measured by the Palmer Drought Severity Index from 1958 to 2007 (USGRCP 2009). Snyder and Sloan (2005) project mean annual precipitation in central western California will decrease by about 3-percent by the end of the century. Statewide, climate models appear to make an average prediction of about 10 percent loss of precipitation by 2100 under a low emissions scenario (Cayan *et al*. 2008). Loss of precipitation may result in lower water flows and higher stream temperatures, which will negatively impact anadromous fish populations.

Warmer temperatures associated with climate change reduce snowpack and alter the seasonality and volume of seasonal hydrograph patterns (Cohen *et al*. 2000). An altered seasonality results in runoff events occurring earlier in the year due to a shift in precipitation falling as rain rather than snow (Roos 1991, Dettinger *et al*. 2004). The Sacramento River basin annual runoff amount for April- to July has been decreasing since about 1950 (Roos 1987, 1991). Increased temperatures influence the timing and magnitude patterns of the hydrograph, which may diminish snowmelt-dominated habitat that species such as stream-type Chinook may be dependent on.

The magnitude of snowpack reductions is subject to annual variability in precipitation and air temperature. The large spring snow water equivalent (SWE) percentage changes, late in the snow season, are due to a variety of factors including reduction in winter precipitation and temperature increases that rapidly melt spring snowpack (VanRheenen *et al.* 2004). Factors modeled by VanRheenen *et al*. (2004) show that the melt season shifts to earlier in the year, leading to a large percent reduction of spring SWE (up to 100 percent in shallow snowpack areas). Additionally, an air temperature increase of 3.8°F (2.1°C) is expected to result in a loss of about half of the average April snowpack storage (VanRheenen et al. 2004).

The projected runoff-timing trends over the course of the twenty-first century are most pronounced in the Pacific Northwest, Sierra Nevada, and Rocky Mountain regions, where peak streamflow (temporal centroid of streamflow each year) change has recently amounted to 20 - 40 days at many streams (Stewart *et al.* 2004). Although climate models diverge with respect to future trends in precipitation, there is widespread agreement that the trend toward lower SWE and earlier snowmelt will continue (Zhu *et al.* 2005, Vicuna *et al.* 2007). Thus, availability of water resources under future climate scenarios is expected to be most limited during the late summer (Gleick and Chalecki 1999, Miles *et al.* 2000). A one-month advance in timing centroid of streamflow would also increase the length of the summer drought that characterizes much of western North America, with important consequences for water supply, ecosystems, and wildfire management (Stewart *et al.* 2004). These changes in peak streamflow timing and snowpack will negatively impact salmonid populations due to habitat loss associated with lower water flows, higher stream temperatures, and increased human demand for water resources.

Human alterations to the atmosphere and landscape can influence water temperature by changing factors that regulate stream temperature, such as discharge, stream morphology, groundwater interactions, riparian condition, and climatic drivers (Poole and Berman 2001). In the Pacific Northwest, summer stream temperatures saw an increase of approximately 0.22 °C/decade between 1980 and 2009 as a result of CO2 emissions (Isaak *et al.* 2012), and are projected to increase on average, +2.83 °C by the 2080s (Isaak *et al*. 2012). As stream temperatures change in response to land management and climate change, cold-water fishes such as Chinook Salmon (*O. tshawytscha*), steelhead (*O. mykiss*), and green sturgeon (*A. medirostris*) may be exposed to temperatures that are outside of their physiologic threshold, resulting in changes to fish communities and potential increased risk of extinction (Poole *et al*. 2001, Urban 2015).

In the marine environment, water is becoming more acidic due to the absorption of CO_2 from the atmosphere. Lower pH could be potentially detrimental to the food chains supporting juvenile salmon as recently observed along the west coast (Feely *et al*. 2008). Ocean acidification could hinder normal growth, development, and survival of young abalone by altering pH levels and the growth of crustose coralline algae (an important component of juvenile settlement habitat).

Additionally, elevated water temperatures could increase disease impacts on black abalone, alter the quantity and quality of food resources (macroalgae), and shift the distribution of black abalone northward if temperatures in the southern part of the range increase above the optimal range. Ocean-warming trends may also have severe consequences to eulachon, particularly in the southern portion of its range, where-ocean warming trends may be the most pronounced and may alter prey, spawning, and rearing success (Gustafson 2010).

In addition to ocean-warming and ocean acidification, sea levels are expected to rise. Sea level rise could alter the distribution and availability of rocky intertidal habitat for black abalone. Sea level rise could also impact juvenile fish in the San Francisco Bay and Delta, as well as in lagoons and estuaries as waters become more brackish and favor towards the marine environment.

The threat to listed species in this opinion from global climate change will increase in the future. Modeling of climate change impacts in California suggests that average summer air temperatures are expected to continue to increase (Lindley *et al.* 2007, Moser *et al.* 2012). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe *et al.* 2004, Moser *et al.* 2012, Kadir *et al.* 2013). Total precipitation in California may decline; critically dry years may increase (Lindley 2007, Schneider 2007, Moser *et al.* 2012). Wildfires are expected to increase in frequency and magnitude (Westerling *et al.* 2011, Moser *et al.* 2012).

In summary, observed and predicted climate change effects are generally detrimental to all of the species addressed in this BO, so unless offset by improvements in other factors, the status of the species and critical habitat is likely to decline over time. The climate change projections referenced above cover the period between the present and approximately 2100. While there is uncertainty associated with projections, which increase over time, the direction of change is relatively certain (McClure *et al.* 2013).

2.2.3 Essential Fish Habitat for Species with Potential to Occur in Action Area

Within the Action Area, EFH designations have been made for all estuarine and coastal waters of California as well as many inland watersheds that support salmon. The following FMPs designate EFH covered under this BO (Figures 4A and 4B):

- Pacific Coast Salmon FMP
- Coastal Pelagic Species FMP
- Pacific Coast Groundfish FMP
- Highly Migratory Species FMP

2.3 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).The action area for this BO consists of all the areas where the environmental effects of actions authorized by FEMA under this program may occur in California. This includes all upland, riparian, and aquatic areas affected by implementation of the Program. To determine which portions of California are within the action area, FEMA completed an analysis at the HU Code 8[11] watershed level, as defined by the U.S. Geological Survey, to identify watersheds and coastal boundaries within the State of California that have any one of the following characteristics:

- Are within the current or historic range of a federally listed anadromous fish or invertebrate species covered under the BO;
- Contain designated or proposed critical habitat for a federally listed anadromous fish or invertebrate species covered under the BO; or
- Contain areas designated as EFH under an approved FMP covered under the BO.

The action area corresponds to an overlay of the above three characteristics within all HU Code 8 watersheds in California. If a watershed contains at least one of the items listed above, it is included in the action area.

The action area, as defined through this process, is shown on Figure 1. Figure 2 shows the range of listed species under NMFS jurisdiction within the action area. Figure 3 shows the critical habitat of listed species under NMFS jurisdiction within the action area. Figures 4A and 4B show the extent of EFH within the action area. The action area includes the entirety of estuaries, waterways, and embayments along the Pacific coastline of California, as shown in Figure 2, including the waters and substrate between the high-tide line to 820 feet (250 meters) beyond the low-tide line. Within the watersheds identified in Figure 1 and 4A, the actual extent of critical habitat and EFH for Pacific Coast Salmon consists of certain waterways, substrate, and riparian zones as identified in the applicable critical habitat designations and FMP.

[11] The U.S. Geological Survey has identified each HU within the United States by a unique HU Code, consisting of two to eight digits based on the four levels of classification in the HU system. The first level of classification divides the Nation into 21 major geographic areas, or regions. The second level of classification divides the 21 regions into 221 subregions. The third level of classification subdivides many of the subregions into accounting units; these 378 hydrologic accounting units are nested within, or can be equivalent to the subregions. The fourth level of classification (or HU Code 8) is the cataloging unit, the smallest element in the hierarchy of HUs. There are 2,264 Cataloging Units in the Nation. Cataloging Units sometimes are called “watersheds.”

Figure 2. The Action Area

Figure 3: Range of Listed Species under NMFS Jurisdiction Within the Action Area

Figure 4: Critical Habitat of Listed Species under NMFS Jurisdiction within the Action Area

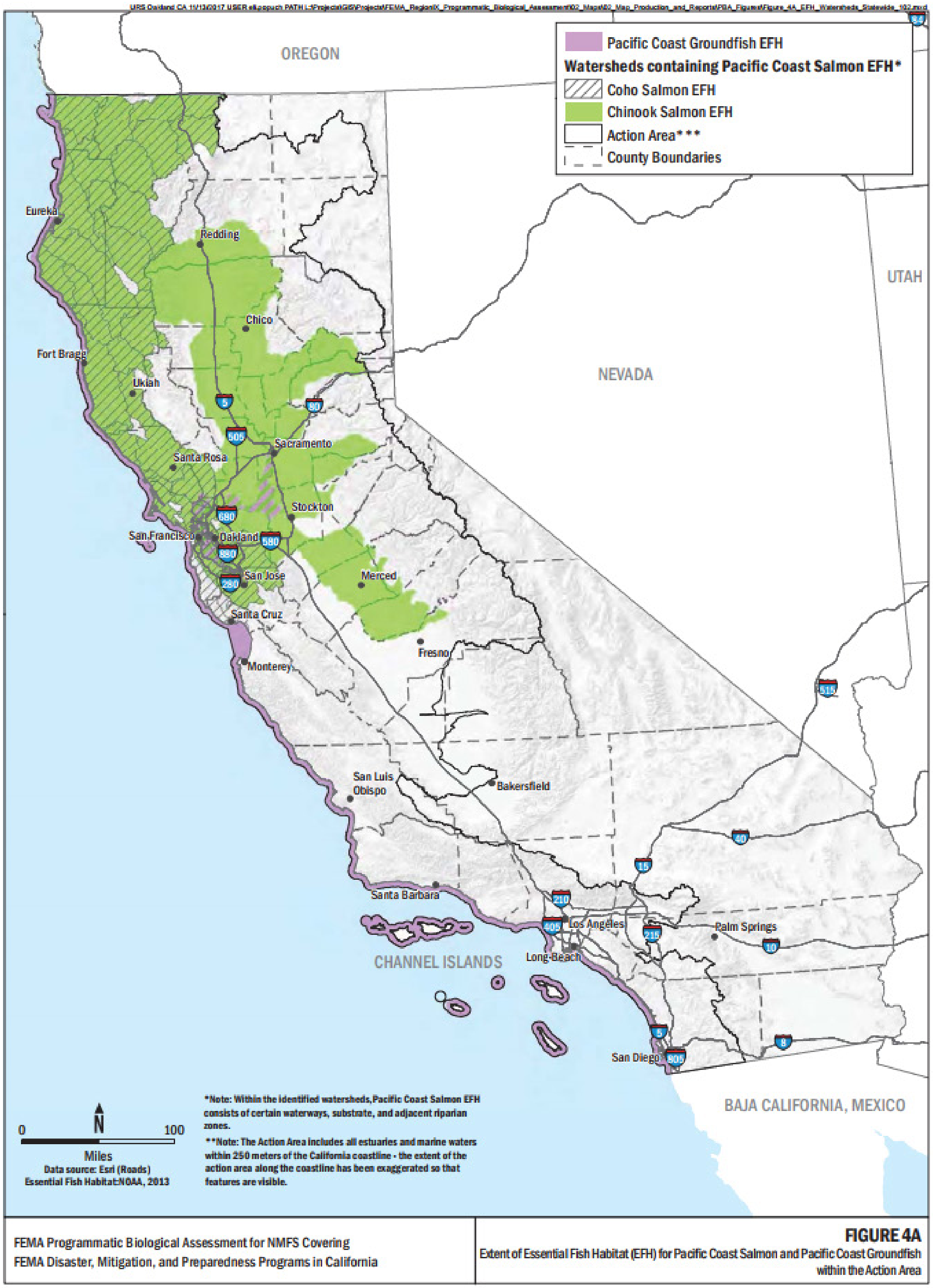

Figure 5. EFH Designation Within the Action Area

Figure 6. EFH Designation Within the Action Area

2.4 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The environmental baseline for this project extends throughout the large action area (see Section 2.3), throughout the state of California. To ascertain the action area with all past, present, and proposed actions, the action area has been divided into three areas: Southern California Coast, Central and Northern California Coast, and California's Central Valley. The environmental baseline has been further divided by types of actions affecting the natural environment.

2.4.1 Southern California

2.4.1.1 Urbanization

Urbanization has degraded anadromous salmonid habitat through stream channel realignment, flood plain drainage, and riparian damage (reviewed in 61 FR 56138). When watersheds are urbanized, problems may result simply because structures are placed in the path of natural runoff processes, or because the urbanization itself has induced changes in the hydrologic regime. In almost every point that urbanization activity touches the watershed, point source and nonpoint source pollution occurs.

Sources of nonpoint pollution, such as sediments washed from the urban areas, contain heavy metals such as copper, cadmium, zinc, and lead. These toxic substances, together with pesticides, herbicides, fertilizers, gasoline, and other petroleum products, contaminate drainage waters and harm aquatic life necessary for anadromous salmonid survival. Water infiltration is reduced due to extensive ground covering with impervious surfaces (*e.g.*, parking lots). As a result, runoff from the watershed is flashier, with increased flood hazard.

2.4.1.2 Flood-Control Activities

Streams within the action area have been altered over the past decades through activities that promote conveyance of flood waters. One activity has involved the removal of large and small woody debris (*e.g.*, live trees, downed tree trunks, limbs, root wads) from instream areas. Routine removal of riparian and instream vegetation has been reported to have a host of adverse consequences for stream-fish populations, including reductions in streamside and instream cover, increased stream temperature, streambank erosion and channel widening, lack of tree root structure creating undercut banks, reductions of live and fallen large woody debris within bankfull channel and reductions in fish abundance (Hicks *et al*. 1991, Thompson 2008, Platts *et al*. 1991). Thompson and others (2012) found that in southern California steelhead streams standing live and dead trees contributed a high proportion, 72 percent, of the total LWD loading within the bankfull width and were often key pieces in wood habitat features. Within the action area, removal of woody debris and vegetation from creeks is widespread, and occurs in numerous creeks each year that are designated critical habitat for steelhead (SBCFCD 2001, Questa 2003, SWCA 2010). Regional studies have identified that the extended summer low-flow period allows trees to become established within the bankfull channel that in turn provide critical habitat features utilized by steelhead (Thompson 2008, Thompson 2012). Given the value of instream woody debris to stream salmonids and the reported effects of woody-debris removal on stream habitats, the annual removal of live and dead stream vegetation has likely caused a reduction in the functional value of designated critical habitat for endangered and threatened steelhead, including a decrease in living- space capacity, and reduced abundance of juvenile steelhead in this portion of the action area.

Flood control and land drainage schemes may concentrate runoff, resulting in increased bank erosion that causes a loss of riparian vegetation and undercut banks and eventually causes widening and down-cutting of natural stream channels. The construction of concrete-lined channels, or channelization, is one flood-control method practitioners have utilized to protect urban infrastructure from concentrated storm runoff. Channelization and concrete-lined flood control channels exist throughout the action area and were constructed and are maintained to decrease roughness and maximize flood conveyance. Channelization of river channels can have numerous deleterious biological effects on waterways, including negative effects to essential features of instream habitat that are important to sustain growth and survival of stream fish (Brookes and Gregory 1988), and is principally responsible for the current character and condition of certain waterways in this portion of the action area.

2.4.1.3 Conversion of Wildland and Land Use

Within the SCCC steelhead action area, some coastal valleys and foothills are extensively developed with agriculture, principally row-crops, orchards, and vineyards. Several of the watersheds within the SCCC steelhead DPS (*e.g.*, Pajaro, Salinas, Santa Rosa, and Arroyo Grande) are developed for commercial agriculture, particularly row crops which are subjected to regular applications of a variety of pesticides (NMFS 2013). The nature and extent of the short and long-term effects of these pesticides on steelhead within the action area has not been extensively studied, and consequently is not well known. Agriculture developments within the Salinas River watershed, including livestock ranching and increasingly vineyards, are important land uses that directly or indirectly affect watershed processes throughout this DPS. A major consequence of agricultural activity in this region is reservoir development (NMFS 2013).

Within the SC steelhead action area, the conversion of wildlands for agriculture is perhaps most prevalent along coastal terraces, like the Santa Maria River Valley, which is intensively farmed. Managed flow releases from Twitchell Dam provide irrigation water to approximately 35,000 acres of cropland (USBR website). Seventy-five percent of the water supply from the Santa Maria River watershed goes to irrigation, watering crops such as sugar beets, strawberries, alfalfa, and, more recently, grapes (USBR 1996). Agricultural and urban development has severely constrained floodplain connectivity on sections of the Santa Maria River floodplain (SWCA 2011). Other areas in the SCC action area where agriculture is a significant land use activity include the Santa Ynez and Santa Clara River Valley in the south (NMFS 2012a).

Estuarine functions are adversely affected through a range of activities, including filling, diking, and draining. Approximately 75 percent of estuarine habitats across the SCCC steelhead DPS have been lost and the remaining 25 percent is constrained by agricultural and urban development, levees, and transportation corridors such as highways and railroads (NMFS 2013).

The SC steelhead DPS has been artificially reduced 70 to 95 percent by development (NMFS 2013). In addition to the loss of overall acreage, the habitat complexity and ecological functions of South-Central and Southern California estuaries have been substantially reduced as a result of: (a) loss of shallow-water habitats such as tidal channels, (b) degradation of water quality through both point and non-point waste discharges, and (c) artificial breaching of the seasonal sandbar at the estuaries mouth which can reduce and degrade steelhead rearing habitat by reducing water depths and the surface area of estuarine habitat.

2.4.1.4 Dams

Dams and diversions have a multitude of effects on fishery resources and quality of steelhead habitat (Blahm 1976, Mundie 1991, Smith 2000, NMFS 2013). Several drainages in San Luis Obispo County are completely blocked to steelhead migration owing to their respective dams, including the Nacimiento River (Nacimiento Reservoir Dam), Old Creek (Whale Rock Dam), West Corral De Piedra (Righetti Dam), Arroyo Grande Creek (Lopez Dam), Santa Maria River (Twitchell Dam), and Chorro Creek (Chorro Creek Dam) (NMFS 2013). All of these dams block steelhead from a substantial portion of the upper watersheds, which contain the majority of historical spawning and rearing habitats for anadromous *O. mykiss*. This habitat remain intact (though inaccessible to anadromous fish) and protected from intensive development as a result of their inclusion in the Los Padres National Forest (NMFS 2013).

Steelhead access to spawning and rearing habitat in the SC DPS action area has also been significantly reduced as a result of dam construction and continued operation on numerous steelhead drainages. The damming of the larger drainages including the Santa Ynez River (Gibraltar Dam and Bradbury Dam), Ventura River (Casitas Dam and Matilija Dam), Piru Creek (Santa Felicia Dam and Pyramid Dam) and Malibu Creek (Rindge Dam) blocks steelhead from historical spawning and rearing habitat because none of these reservoirs were constructed to allow fish passage. The amount of historical spawning and rearing habitat rendered unavailable to steelhead in these watersheds due to the construction of dams is substantial. As an example, the Santa Felicia Dam blocks 95 percent of the steelhead habitat within the Piru Creek watershed; more than 30 miles of stream lies between Santa Felicia Dam and Pyramid Dam alone (NMFS 2008a).

Remnant steelhead populations that reside upstream of dams have the potential to occasionally out- migrate downstream past these dams, but *O. mykiss* survival is expected to be low. The reason for the low expected survival is that steelhead smolts must migrate through large, static reservoirs and either pass over high-head dams via steep spillways or through the dam by circumventing the high velocity outlet works (*i.e.*, gates, energy dissipators). Operations of dams and diversions may decrease water available for surface flows, reducing rearing opportunities for steelhead and adversely affecting the physicochemical and biological characteristics of streams (Poff 1997).

2.4.1.5 Surface and Groundwater Withdrawals

In addition to blocking threatened and endangered steelhead from historical spawning and rearing habitats, the agricultural, municipal and private withdrawal of surface and groundwater from drainages in the action area, as well as characteristics of local geology, can lead to reach-specific instream dewatering primarily during the dry season and periods of below normal rainfall (NMFS 2012b, 2013). The artificial reduction in the amount and extent of surface flows can translate into decreased living space for steelhead, particularly over-summering juveniles and potentially death of this specific life stage (Spina 2006). Because freshwater rearing sites for over-summering steelhead are geographically limited throughout southern California, including the action area, the artificial reduction in freshwater rearing sites for juveniles during the summer can translate into a reduction in abundance of juvenile steelhead and, therefore, the number of returning adults in subsequent years.

Many larger screened diversions are installed on streams by constructing low-head dams that pond water and allow for stream diversion while providing some portion of discharge as a “bypass” flow for the intended purpose of providing sufficient fish migration flows. One such facility is the Robles Diversion Dam on the Ventura River, which is capable of diverting up to 500 cubic feet per second (cfs) discharge in a concrete channel, while the Casitas Municipal Water District maintains a minimum 50-cfs augmentation flow in the mainstem river for fish passage. Diversion dams can affect steelhead by causing migration delays and attenuating stream discharge that serves as a natural cue for migratory fish to emigrate in unregulated rivers, and affect habitat by disrupting the natural transport of spawning gravels and establishment of healthy riparian vegetation. Operation of unscreened diversions in this portion of the action area can disrupt migration of steelhead and prevent a large fraction of smolts from reaching the ocean due to entrainment of juveniles.

Groundwater withdrawals (primarily for irrigation) have reduced surface streamflow in many streams throughout California which has the functional effect of decreasing the amount and quality of steelhead rearing habitat. Water quantity problems are a significant cause of habitat degradation and depressed fish populations. Although some of the water withdrawn from streams eventually returns as agricultural runoff or groundwater recharge, crops consume a large proportion of it.

Water withdrawals have a significant effect on steelhead over-summer rearing habitat and seasonal flow patterns by removing water from streams when discharge is naturally modest (i.e., May through September). Over-summer rearing habitat has been found to be the most restricted habitat type in the SCCC and SC DPSs (Boughton and Goslin 2006).

2.4.1.6 Gravel Mining

Extraction of alluvial material from within or near a streambed has a direct impact on the stream’s physical habitat parameters such as channel hydraulics, morphology, sediment transport, bed elevation, and substrate composition (NMFS 2005b). Rivier (1985) suggests that the detrimental effects to biota resulting from bed-material mining are caused by two main processes: (1) alteration of the flow patterns resulting from modification of the river bed, and (2) an excess of suspended sediment.

The aggregate mining in the Santa Maria River and lower Sisquoc River since the early 1900's is expected to have caused a number of adverse effects on the quality and availability of habitat for endangered steelhead, given the reported effects of gravel mining on riverine environments (Kondolf 1997). Gravel mining can lead to overall physical degradation to the structure and function of river channels. In turn, a reduction in the physical and biological capability of the channel to support growth and survival of stream fish can be observed as well as an overall reduction in abundance.

Mining of sand and gravel occur in certain watersheds within San Luis Obispo County (*e.g.*, Salinas River, San Simeon Creek). Mining can contribute soil to streams, and cause sedimentation and turbidity, which can be harmful to fish (Cordone 1961, Hillman *et al*. 1987, Chapman 1988) and their habitat (Alexander 1986).

2.4.2 Central and Northern California

2.4.2.1 Timber Harvest

Timber harvest and associated activities occur over a large portion of the action area in the North Coastal range. Timber harvest has caused widespread increases in sediment delivery to channels through both increased landsliding and surface erosion from harvest units and log decks. Much of the riparian vegetation has been removed, reducing future sources of LWD needed to form and maintain stream habitat that salmonids depend on during various life stages.

In fish-bearing streams, woody debris is important for storing sediment, halting debris flows, and decreasing downstream flood peaks, and its role as a habitat element becomes directly relevant for Pacific salmon species (Reid 1998). LWD alters the longitudinal profile and reduces the local gradient of the channel, especially when log dams create slack pools above or plunge pools below them, or when they are sites of sediment accumulation (Swanston 1991).

Road construction, use, and maintenance, tree-felling, log hauling, slash disposal, site preparation for replanting, and soil compaction by logging equipment are all potential sources of fine sediment that could ultimately deliver to streams (Hicks *et al*. 1991, Murphy 1995). The potential for delivering sediment to streams increases as hillslope gradients increase (Murphy 1995). The soils in virgin forests generally resist surface erosion because their coarse texture and thick layer of organic material and moss prevent overland flow (Murphy 1995). Activities associated with timber management decrease the ability of forest soils to resist erosion and contribute to fine sediment in the stream. Yarding activities that cause extensive soil disturbance and compaction can increase splash erosion and channelize overland flow. Site preparation and other actions which result in the loss of the protective humic layer can increase the potential for surface erosion (Hicks *et al*. 1991). Controlled fires can also consume downed wood that had been acting as sediment dams on hillslopes. After harvesting, root strength declines, often leading to slumps, landslides, and surface erosion (FEMAT 1993, Thomas *et al*. 1993). Riparian tree roots provide bank stability and streambank sloughing. Erosion often increases if these trees are removed, leading to increases in sediment and loss of overhanging banks, which are important habitat for rearing Pacific salmonids (Murphy 1995). Where rates of timber harvest are high, the effects of individual harvest units on watercourses are cumulative. Therefore, in sub-watersheds where timber harvest is concentrated in a relatively short period of time, we expect that fine sediment impacts will be similarly concentrated.

Cumulatively, the increased sediment delivery and reduced woody debris supply have led to widespread impacts to stream habitats and salmonids. These impacts include reduced spawning habitat quality, loss of pool habitat for adult holding and juvenile rearing, loss of velocity refugia, and increases in the levels and duration of turbidity which reduce the ability of juvenile fish to feed and, in some cases, may cause physical harm by abrading the gills of individual fish. These changes in habitat have led to widespread decreases in the carrying capacity of streams that support salmonids.

2.4.2.2 Road Construction

Road construction, whether associated with timber harvest or other activities, has caused widespread impacts to salmonids (Furniss 1991). Where roads cross salmonid-bearing streams, improperly placed culverts have blocked access to many stream reaches. Land sliding and chronic surface erosion from road surfaces are large sources of sediment across the affected species' ranges. Roads also have the potential to increase peak flows and reduce summer base flows with consequent effects on the stability of stream substrates and banks. Roads have led to widespread impacts on salmonids by increasing the sediment loads. The consequent impacts on habitat include reductions in spawning, rearing and holding habitat, and increases in turbidity.

Construction of road networks can also greatly accelerate erosion rates within a watershed (Haupt 1959, Swanson and Dryness 1975, Swanston and Swanson 1976). Once constructed, existing road networks are a chronic source of sediment to streams (Swanston 1991) and are generally considered the main cause of accelerated surface erosion in forests across the western United States (Harr and Nichols 1993). Processes initiated or affected by roads include landslides, surface erosion, secondary surface erosion (landslide scars exposed to rainsplash), and gullying. Roads and related ditch networks are often connected to streams via surface flow paths, providing a direct conduit for sediment. Where roads and ditches are maintained periodically by blading, the amount of sediment delivered continuously to streams may temporarily increase as bare soil is exposed and ditch roughness features which store and route sediment and also armor the ditch are removed. Hagans and Weaver (1987) found that fluvial hillslope erosion associated with roads in the lower portions of the Redwood Creek watershed produced about as much sediment as landslide erosion between 1954 and 1980 (Hagans and Weaver 1987). In the Mattole River watershed, the Mattole Salmon Group (1997) found that roads, including logging haul roads and skid trails, were the source of 76% of all erosion problems mapped in the watershed (Mattole Salmon Group 1997). This does suggest that, overall, roads are a primary source of sediment in managed watersheds.

Road surface erosion is particularly affected by traffic, which increases sediment yields substantially (Reid and Dunne 1984). Other important factors that affect road surface erosion include condition of the road surface, timing of when the roads are used in relation to rainfall, road prism moisture content, location of the road relative to watercourses, methods used to construct the road, and steepness on which the road is located.

2.4.2.3 Hatcheries

Hatchery operations potentially conflict with salmon recovery in the action area. Three large mitigation hatcheries release roughly 14,215,000 hatchery salmonids into SONCC coho salmon ESU rivers annually. Additionally, a few smaller hatcheries, such as Mad River Hatchery and Rowdy Creek Hatchery (Smith River) add to the production of hatchery fish. Both intra- and inter-specific interactions between hatchery salmon and SONCC coho salmon occur in freshwater and saltwater.

Flagg *et al*. (2000) found that, except in situations of low wild fish density, increasing releases of hatchery fish leads to displacement of wild fish from portions of their habitat. Competition between hatchery- and naturally-produced salmonids has also been found to lead to reduced growth of naturally produced fish (McMichael *et al.* 1997). Kostow (2003) and Kostow and Zhou (2006) found that over the duration of the steelhead hatchery program on the Clackamas River, Oregon, the number of hatchery steelhead in the upper basin regularly caused the total number of steelhead to exceed carrying capacity, triggering density-dependent mechanisms that impacted the natural population. Competition between hatchery and natural salmonids in the ocean has also been shown to lead to density-dependent mechanisms that affect natural salmonid populations, especially during periods of poor ocean conditions (Beamish *et al*. 1997, Levin *et al.* 2001, Sweeting *et al*. 2003).

NMFS specifically identified the past practices of the Mad River Hatchery as potentially damaging to NC steelhead. CDFG out-planted non-indigenous Mad River Hatchery brood stocks to other streams within the ESU, and attempted to cultivate a run of non-indigenous summer steelhead within the Mad River. CDFG ended these practices in 1996. The currently operating Mad River Hatcheryand Iron Gate Hatchery operate in the action area under NMFS approved Hatchery and Genetics Management Plans and have been identified as having potentially harmful effects to wild salmon populations. The Trinity Rivier Hatchery also operates in the action area and is currently undergoing a review process to reduce its adverse effects on the natual salmon population.

2.4.2.4 Water Diversions and Habitat Blockages

Stream-flow diversions are common throughout the species' ranges. Unscreened diversions for agricultural, domestic and industrial uses are a significant factor for salmonid declines in many basins. Reduced stream-flows due to diversions reduce the amount of habitat available to salmonids and can degrade water quality, such as causing water temperatures to elevate more easily. Reductions in the water quantity will reduce the carrying capacity of the affected stream reach. Where warm return flows enter the stream, fish may seek reaches with cooler water, thus increasing competitive pressures in other areas.

Hydropower, flood control, and water supply dams of different municipal and private entities, particularly in the Klamath Basin, have permanently blocked or hindered salmonid access to historical spawning and rearing grounds. Since 1908, the construction of the Potter Valley Project dams has blocked access to a majority of the historic salmonid habitat within the mainstem Eel River watershed. The percentage of habitat lost blocked by dams is likely greatest for steelhead because steelhead were more extensively distributed upstream than Chinook or coho salmon. As a result of migrational barriers, salmon and steelhead populations have been confined to lower elevation mainstems that historically only were used for migration and rearing. Population abundances have declined in many streams due to decreased quantity, quality, and spatial distribution of spawning and rearing habitat (Lindley *et al.* 2007b). Higher temperatures at these lower elevations during late-summer and fall are also a major stressor to adult and juvenile salmonids.

2.4.2.5 Predation

Predation was not believed to play a major role in the decline of salmon populations; however, it may have had substantial impacts at local levels. For example, Higgins *et al*. (1992) and CDFG (1994) reported that Sacramento River pikeminnow have been found in the Eel River basin and are considered a major threat to native salmonids. Furthermore, populations of California sea lions and Pacific harbor seals, known predators of salmonids which occur in most estuaries and rivers where salmonid runs occur on the West Coast, have increased to historical levels because harvest of these animals has been prohibited by the Marine Mammal Protection Act of 1972 (Fresh 1997).

However, salmonids appear to be a minor component of the diet of marine mammals (Scheffer and Sperry 1931). In the final rule listing the SONCC coho salmon ESU (62 FR 24588), for example, NMFS indicated that it was unlikely that pinniped predation was a significant factor in the decline of coho salmon on the west coast, although they may be a threat to existing depressed local populations. (NMFS 2007a) determined that although pinniped predation did not cause the decline of salmonid populations, predation may preclude recovery of these populations in localized areas where they co-occur with salmonids (especially where salmonids concentrate or passage may be constricted). Specific areas where pinniped predation may preclude recovery cannot be determined without extensive studies.

The increased impact of certain predators has been, to a large degree, the result of ecosystem modification. Therefore, it would seem more likely that increased predation is but a symptom of a much larger problem, namely, habitat modification and a decrease in water quantity and quality. With the decrease in quality riverine and estuarine habitats, increased predation by freshwater, avian, and marine predators will occur. Without adequate avoidance habitat (e.g., deep pools and estuaries, and undercut banks) and adequate migration and rearing flows, predation may play a role in the reduction of some salmonid populations.

2.4.2.6 Disease

Disease has not been identified as a major factor in the decline of ESA-listed salmonids. However, disease may have substantial impacts in some areas and may limit recovery of local salmon populations. Although naturally occurring, many of the disease issues salmon and steelhead currently face have been exacerbated by human-induced environmental factors such as water regulation (damming and diverting) and habitat alteration. Natural populations of salmonids have co-evolved with pathogens that are endemic to the areas salmonids inhabit and have developed levels of resistance to them. In general, diseases do not cause significant mortality in native salmonid stocks in natural habitats (Shapovalov and Taft 1954). However, when this natural habitat is altered or degraded, outbreaks can occur. For example, ceratomyxosis, which is caused by *Ceratomyxa shasta*, has been identified as one of the most significant diseases for juvenile salmon in the Klamath Basin due to its prevalence and impacts there that are related to reduced flows and increased water temperatures (Nichols *et al.* 2007).

2.4.2.7 Fish Harvest

Salmon and steelhead once supported extensive tribal, commercial, and recreational fisheries. NMFS has identified over-utilization as a significant factor in their decline. This harvest strongly affected salmonid populations because, each year, it removed adult fish before they spawned, reducing the numbers of offspring in the next generation. In modern times, steelhead are rarely caught in ocean salmon fisheries. Directed ocean Chinook salmon fisheries are currently managed by NMFS to achieve Federal conservation goals for west coast salmon in the Pacific Coast Salmon Fishery Management Plan (FMP). The goals specify the numbers of adults that must be allowed to spawn annually, or maximum allowable adult harvest rates. In addition to the FMP goals, salmon fisheries must meet requirements developed through NMFS' intra-agency section 7 consultations, including limiting the incidental mortality rate of ESA-listed salmonids.

2.4.2.8 Agriculture

Many watersheds have been affected by agriculture, particularly throughout the central part of this area. Examples include the San Pablo Bay, Bodega Bay, Navarro River, and Gualala River watersheds. Historically, orchard, dairy and grazing were the dominant land use activities through many of these watersheds, though more recently, vineyards development has become increasingly popular. Napa, Sonoma, and Mendocino counties, for example, hosts an expanding population and wine industry.

A more recently recognized agricultural threat in the area is the illicit cultivation of marijuana. Many marijuana farms practice illegal, unregulated activities such as unregulated pesticide use, habitat destruction, and illegal damming and diversion of headwater streams for irrigating the illegal growing operations.

Past and present agricultural practices have resulted in numerous small dams and water diversions that alter streamflows and temperature conditions. Agricultural practices have likely contributed to depressed habitat conditions within waters such as the Navarro River watershed and Elkhorn Slough. The Pajaro River contains fecal coliform, nutrients, and sedimentation/siltation and is included on the 2012 Clean Water Act section 303(d) list of water quality limited segments (CSWRCB 2012). Suitable spawning and rearing habitat for S-CCC steelhead was once found on the mainstem Pajaro River, but now the mainstem functions solely as a migratory corridor because of impacts from flood control projects, agriculture, and water withdrawals for agricultural use.

2.4.2.9 Urbanization

Urban development is extensive within many portions the central part of the Northern California coast and has negatively affected the quality and quantity of ESA-listed species' habitat. Within the San Francisco Bay Area, human population is approximately six million, representing the fourth most populous metropolitan area in the United States, and continued growth is expected (www.census.gov). In the past 150 years, the diking and filling of tidal marshes has decreased the surface area of the greater San Francisco Bay by 37 percent. More than 500,000 acres of the estuary's historic tidal wetlands have been converted for farm, salt pond, and urban uses (San Francisco Estuary Project 1992). These changes have diminished tidal marsh habitat, increased pollutant loadings to the estuary, and degraded shoreline habitat due to the installation of docks, shipping wharves, marinas, and miles of rock riprap for erosion protection. Most tributary streams have lost habitat through channelization, riparian vegetation removal, water development, and reduced water quality.

2.4.3 California Central Valley

2.4.3.1 Dams

Dams are considered a major cause of the widespread decline of CV salmonids. Lindley *et al.* (2006) estimated that 80 percent of historically available steelhead habitat has been lost to impassable dams. On the Sacramento River, the construction of Keswick and Shasta dams in the 1940s blocked access to historical spawning and rearing habitat, which is no longer accessible to anadromous fish. Winter-run Chinook salmon have lost access to historical habitat in the Upper Sacramento River (upstream of Shasta Dam), the McCloud River, and the Pit River. This blockage merged at least three independent winter-run Chinook populations into a single population, resulting in a substantial loss of abundance, genetic diversity, life history variability, and local adaptation.

Hydroelectric power facilities, small dams, and operations caused habitat loss and degradation on Battle Creek, leading to the extirpation of winter-run Chinook salmon from that watershed in the early 1900s (Reynolds 1993). Watershed restoration actions associated with the Battle Creek Salmon and Steelhead Restoration Project are expected to restore conditions that will allow for successful reintroduction of a second population of winter-run to Battle Creek. A Fish Passage Team is currently discussing plans for a pilot reintroduction above Shasta Dam as part of the Reasonable and Prudent Alternative (RPA) actions of the 2009 NMFS biological opinion on the Long Term Operations of the CVP and SWP (NMFS 2009a).

The Redd Bluff Diversion Dam (RBDD) on the Sacramento River historically created impediments to fish passage by utilizing gates to divert water for agriculture and urban uses. RBDD has impaired passage to upstream migrating adults and out-migrating juveniles, and the dam’s lighting system attracted predatory fish that were responsible for devouring many out-migrating juveniles. The gates have remained open since 2012, however, to allow passage for green sturgeon and anadromous individuals (USFWS 2014).

Before Friant Dam was completed in 1942 an estimated 50,000 CV spring-run Chinook migrated up the San Joaquin River (Fry 1961). The Friant Dam has caused about 60 miles (97 km) of the river to run dry, except in high water years when floodwaters are spilled from the dam. As a result, nearly the entire CVS Chinook run in the San Joaquin Basin was extirpated by the 1950s (Yoshiyama *et al.* 1998).

For more than 60 years, the mainstem San Joaquin River had been dry, but a settlement agreement in September 2006 sparked the implementation of the San Joaquin River Restoration Program (SJRRP) (a partnership between NMFS, USFWS, CDFW, water users, Reclamation, and other stakeholders). The SJRRP has secured flows from Friant Dam to provide access to spawning, rearing, and migration habitat for an experimental population of CVS Chinook that was reintroduced to the river under section 10(j) of the ESA. Since the reintroduction, "spring-running" adults have been documented migrating into the San Joaquin tributaries (Franks 2014).

It is likely that sDPS green sturgeon passage is blocked by impassible dams. sDPS green sturgeon have been observed at the base of impassable dams such as the Fish Barrier Dam (pers. comm. Alicia Seesholtz, DWR) on the Feather River and at Daguerre Point Dam on the Yuba River (Bergman *et al.* 2011), suggesting the possibility that adult green sturgeon would migrate further upstream, if possible.

Cold water releases from dams provide cool temperatures suitable for egg incubation, fry emergence, and juvenile rearing in the Sacramento River. However, warm water releases from Shasta Dam have been a significant stressor to all runs of salmon and steelhead in the Central Valley, especially given the recent extended drought in California in 2012-2015 (NMFS 2016c). In an effort to provide a continuous supply of cold water, a temperature control device (TCD) was installed on Shasta Dam in 1997. Although the TCD was built for the winter-run Chinook, it has also benefited other runs. Other efforts to reduce likelihood of warm water releases from Shasta Dam include improving reservoir meteorological and hydrologic modeling and monitoring, in order to most efficiently and effectively manage the reservoir's limited amount of cold water, and installation of additional temperature monitoring stations in the upper Sacramento River (NMFS 2016k).

Through the 2009 Biological Opinion on the long-term water operation of the CVP/ SWP (NMFS 2009a), Reclamation has created and implemented Shasta Reservoir storage plans and year-round Keswick Dam release schedules and procedures with the goal of providing cold water for spawning and rearing (NMFS 2016k).

2.4.3.2 Agriculture

The construction of the massive levee system in the Central Valley in the 19th and early 20th centuries to prevent flooding of agricultural fields was historically the biggest impact agriculture had on salmonids. Levee development in the Central Valley affects PBFs including: spawning habitat, freshwater rearing habitat, freshwater migration corridors, and estuarine habitat. Except in a few places such as Yolo and Sutter bybasses, levee building on the Sacramento River has prevented Chinook and steelhead juveniles from accessing these habitats.

Floodplains and backwater habitat are important for rearing juveniles. Sommer *et al*. (2001), Jeffres *et al.* (2008), and Katz *et al.* (2017) indicate significantly higher growth rates for juvenile Chinook rearing on floodplains as opposed to those rearing in riverine habitats. Hill and Webber (1999) found juvenile CVS Chinook rearing on the Sutter Bypass will likely emerge from that habitat nearly double their size at emigration from Butte, Mill, and Deer Creeks. This significant weight increase in the floodplain habitats is directly tied to increased survival at sea (Williams 2006).

Since the 1850s, wetlands reclamation for urban and agricultural development has caused the cumulative loss of 79 and 94 percent of the tidal marsh habitat in the Delta downstream and upstream of Chipps Island, respectively (Conomos *et al.* 1985, Nichols 1986, Phillips 1988, Monroe 1992, Goals Project 1999). Prior to 1850, approximately 1400 km^2 of freshwater marsh surrounded the confluence of the Sacramento and San Joaquin rivers, and another 800 km^2 of saltwater marsh fringed San Francisco Bay's margins. Of the original 2,200 km^2 of tidally influenced marsh, only about 125 km^2 of un-diked marsh remains today.

Water diversions are another component of agriculture that have adversely impacted ESA-listed fish species in the Central Valley. As much as 60 percent of the natural historical inflow to Central Valley watersheds and the Delta have been diverted for human uses. Agricultural diversions have caused direct and indirect harm by ways of entrainment, altering flow, and reducing water quality by causing higher water temperatures and increasing contaminants.

The CVP and SWP pumps in the southern Delta pull Sacramento River water to support agriculture in the southern Central Valley and provide water for the Bay area and southern California cities. Outmigrant juvenile salmonids in the Delta have been subjected to adverse environmental conditions created by water export operations at the CVP and SWP facilities. Specifically, juvenile salmonid survival has been reduced by the following: (1) water diversions from the main stem Sacramento River into the Central Delta via the Delta Cross Channel; (2) upstream or reverse flows of water in the lower San Joaquin River and southern Delta waterways; (3) entrainment at the CVP/SWP export facilities and extremely low survival in Clifton Court Forebay; and (4) increased exposure to introduced, non-native predators such as striped bass, largemouth bass (*Micropterus salmoides*), and smallmouth bass (*Micropterus dolomieu*).

NMFS issued a Biological Opinion on the impacts of the pumping procedures on salmon, sturgeon and killer whales that resulted in a jeopardy determination (NMFS 2009b). NMFS now partners with the USFWS, CDFW, the SWRCB, DWR, and others to ensure that water operations do not jeopardize the continued existence of winter-run Chinook.

2.4.3.3 Land use activities

Prior to the 1840's, the Sacramento River was bordered by up to 500,000 acres of riparian forest, with bands of vegetation extending outward for 4 or 5 miles (California Resources Agency 1989). Starting in the California gold rush era, these vast riparian forests were cleared for building materials, fuel, and to clear land for farms. By 1979, riparian habitat along the Sacramento River diminished to 11,000 - 12,000 acres, or about 2 percent of historic levels (McGill and Price 1987). The clearing of the riparian forests removed a vital source of snags and driftwood (*i.e.,* LWM) in the Sacramento and San Joaquin River basins. This has reduced the volume of LWM, which is needed to form and maintain stream habitat that salmon depend on. In addition, removal of snags and obstructions from the active river channel for navigational safety has further reduced the presence of LWM in the Sacramento and San Joaquin rivers, as well as the Delta.

Prior to the 1970s, there was so much woody material resulting from poor logging practices that many streams were completely clogged and were thought to have been total barriers to fish migration. As a result, in the 1960s and early 1970s it was common practice among fishery management agencies to remove woody material thought to be a barrier to fish migration (NMFS 1996). However, it is now recognized that too much LWM was removed from the streams resulting in a loss of salmonid habitat and it is thought that the large scale removal of woody material prior to 1980 had major, long-term negative effects on rearing habitats for salmonids in northern California (NMFS 1996). Areas that were subjected to this removal of LWM are still limited in their ability to contribute to the recovery of salmonid stocks.

Reduction of wood in the stream channel, either from past or present activities, generally reduces pool quantity and quality, alters stream shading which can affect water temperature regimes and nutrient input, and can eliminate critical stream habitat needed for both vertebrate and invertebrate populations.

Past mining activities routinely resulted in the removal of spawning gravels from streams, the straightening and channelization of the stream corridor from dredging activities, and the leaching of toxic effluents into streams from mining operations. Many of the effects of past mining operations continue to impact salmonid habitat today. Current mining practices include suction dredging (sand and gravel mining), placer mining, lode mining and gravel mining. Present day mining practices are typically less intrusive than historic operations (hydraulic mining), however, adverse impacts to salmonid habitat still occur.

Dredging of river channels to enhance inland maritime trade and to provide raw material for levee construction has significantly altered the natural hydrology and function of the river systems in the Central Valley. Starting in the mid-1800s, the United States Army Corp of Engineers (Corps) and other private consortiums began straightening river channels and artificially deepening them to enhance shipping commerce. This has led to declines in the natural meandering of river channels and the formation of pool and riffle segments. The deepening of channels beyond their natural depth also has led to a significant alteration in the transport of bed load in the riverine system as well as the local flow velocity in the channel (Mount 1995). The creation of levees and the deep shipping channels reduced the natural tendency of the San Joaquin and Sacramento rivers to create floodplains along their banks with seasonal inundations during the wet winter season and the spring snow melt periods. These annual inundations provided necessary habitat for rearing and foraging of juvenile native fish that evolved with this flooding process.

2.4.3.4 Water Quality

The water quality of the Delta has been negatively impacted over the last 150 years. Increased water temperatures, decreased dissolved oxygen (DO) levels, and increased turbidity and contaminant loads have degraded the quality of the aquatic habitat for the rearing and migration of salmonids, Eulachon, and green sturgeon. Some common pollutants include effluent from wastewater treatment plants and chemical discharges such as dioxin from San Francisco Bay petroleum refineries (McEwan and Jackson 1996). In addition, agricultural drain water, another possible source of contaminants, can contribute up to 30 percent of the total inflow into the Sacramento River during the low-flow period of a dry year. The Regional Board, in its 1998 Clean Water Act §303(d) list characterized the Delta as an impaired waterbody having elevated levels of chlorpyrifos, dichlorodiphenyltrichlor (*i.e.* DDT), diazinon, electrical conductivity, Group A pesticides [aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorocyclohexanes (including lindane), endosulfan and toxaphene], mercury, low DO, organic enrichment, and unknown toxicities (Regional Board 1998, 2001, 2010).

In general, water degradation or contamination can lead to either acute toxicity, resulting in death when concentrations are sufficiently elevated, or more typically, when concentrations are lower, to chronic or sublethal effects that reduce the physical health of the organism, and lessens its survival over an extended period of time. Mortality may become a secondary effect due to compromised physiology or behavioral changes that lessen the organism's ability to carry out its normal activities. For example, increased levels of heavy metals are detrimental to the health of an organism because they interfere with metabolic functions by inhibiting key enzyme activity in metabolic pathways, decrease neurological function, degrade cardiovascular output, and act as mutagens, teratogens or carcinogens in exposed organisms (Rand 1995, Goyer 1996). For listed species, these effects may occur directly to the listed fish or to its prey base, which reduces the forage base available to the listed species.

In the aquatic environment, most anthropogenic chemicals and waste materials, including toxic organic and inorganic chemicals that eventually accumulate in sediment (Ingersoll 1995). Direct exposure to contaminated sediments may cause deleterious effects to listed salmonids and green sturgeon. This may occur if a fish swims through a plume of the resuspended sediments or rests on contaminated substrate and absorbs the toxic compounds through one of several routes: dermal contact, ingestion, or uptake across the gills. Elevated contaminant levels may be found in localized “hot spots” where discharge occurs or where river currents deposit sediment loads.

Sediment contaminant levels can thus be significantly higher than the overlying water column concentrations (USEPA 1994). However, the more likely route of exposure to salmonids or green sturgeon is through the food chain, when the fish feed on organisms that are contaminated with toxic compounds. Prey species become contaminated either by feeding on the detritus associated with the sediments or dwelling in the sediment itself. Therefore, the degree of exposure to the salmonids and green sturgeon depends on their trophic level and the amount of contaminated forage base they consume. Response of salmonids and green sturgeon to contaminated sediments is similar to water borne exposures once the contaminant has entered the body of the fish.

2.4.3.5 Hatcheries

Six hatcheries currently produce Chinook salmon, and four produce steelhead in the Central Valley. Livingston-Stone National Fish Hatchery (LSNFH), located directly below Shasta Dam, is the only hatchery that produces winter-run Chinook salmon in the Central Valley. LSNFH produces on average 250,000 juveniles per year. Depending on the estimated return, only 90 to 120 returning adults are spawned per year.

LSNFH is a conservation hatchery with the objectives of monitoring and supplementing the naturally spawning population. Initially, the program was meant to jump start recovery of a very low population that was on the verge of extinction (*e.g.*, 186 spawners in 1994). However, since hatchery fish may negatively affect the genetic constitution of natural-origin fish (Hindar 1991, Allendorf 1997), LSNFH preferentially collects no more than 15 percent of the estimated winter-run Chinook salmon spawning escapement. Current estimates of the numerical contribution of the LSNFH hatchery program to the natural population are estimated between 5 and 20 percent (Lindley *et al.* 2007b), except in 2012, which was 30 percent. There is a concern that if the contribution of hatchery fish remains at the higher end of this range, potential impacts associated with genetic introgression are a risk.

CV spring-run Chinook salmon ESU includes fish naturally occurring in the Sacramento River and its tributaries, as well as those from the FRFH. The FRFH currently releases at least half of the spring-run Chinook salmon production into net pens in the San Francisco Bay. The management practices at FRFH has directly impacted spring-run Chinook salmon populations by oversaturating the natural carrying capacity of the limited habitat available below dams. In the case of the Feather River, significant redd superimposition occurs in-river due to hatchery overproduction and the inability to physically separate spring- and fall-run Chinook salmon adults. This concurrent spawning has led to hybridization between the spring- and fall-run Chinook salmon in the Feather River.

The Coleman National Fish Hatchery on the Sacramento River, the Feather River Hatchery, Mokelumne River Hatchery, and Nimbus Hatchery on the American River produce an average of 1.5 million juvenile CV steelhead per year (McEwan 2001a). Broodstock from outside the Central Valley have been used in all four hatcheries and have contributed to the elevated straying levels (U.S. Department of the Interior 1999).

The increase in Central Valley hatchery production has reversed the composition of the steelhead population, from 88 percent naturally produced fish in the 1950s (McEwan 2001a) to an estimated 23 to 37 percent naturally produced fish by 2000 (Nobriga and Cadrett 2001), and less than 10 percent currently (NMFS 2011a, c). The increase in hatchery steelhead production proportionate to the wild population has reduced the viability of the wild steelhead populations, increased the use of out-of-basin stocks for hatchery production, and increased straying (NMFS and CDFG 2001). Thus, the ability of natural populations to successfully reproduce and continue their genetic integrity has likely been diminished.

2.4.3.6 Fish Harvest

Extensive ocean recreational and commercial troll fisheries for Chinook salmon exist along the Northern and Central California coast, and an inland recreational fishery exists in the Central Valley for Chinook salmon and CV steelhead.

Winter-run Chinook salmon are primarily caught in the recreational fishery from Point Arena south to Monterey Bay (NMFS 2016j). Recent estimates for the years 2000-2013, excluding 2008-2010 when the fishery was closed, averaged 19% of the age-3 winter-run were taken annually by the ocean fishery (PFMC 2015). In 2012, the PFMC implemented specific control curves for winter-run Chinook salmon that reduced the level of ocean harvest depending on the annual population abundance (O'Farrell *et al.* 2012, Winship *et al*. 2013, PFMC 2013).

For CV spring-run, extensive ocean fisheries (both recreational and commercial) exist along the Central and Northern California coast up into Oregon. The in-river recreational fishery has historically taken CV spring-run throughout the species’ range within the Central Valley; however, regulations have been added. Specifically, closing CV spring-run spawning areas to fishing in Mill, Deer, Butte, and Big Chico creeks and the Yuba River. An extensive recreational fishery still occurs within the Feather River mainly due to the presence of the FRFH.

There is no ocean fishery for CV steelhead. However, there is an extensive freshwater recreational fishery. Hallock *et al*. (1961) estimated that harvest rates for Sacramento River steelhead from the 1953-1954 through 1958-1959 seasons ranged from 25.1–45.6 percent, assuming a 20 percent non-return rate of tags. The average annual harvest rate of adult steelhead above RBDD for the 3-year period from 1991-1992 through 1993-1994 was 16 percent (McEwan and Jackson 1996). Since 1998, all hatchery steelhead have been marked with an adipose fin clip allowing anglers to distinguish hatchery and wild steelhead. The freshwater fishery prohibits the harvest of naturally spawned steelhead within the Central Valley, and take is limited to one hatchery (marked) fish per day. Overall, the marking of hatchery steelhead has greatly increased protection of naturally produced steelhead; however, the total number of CV steelhead caught is likely a significant fraction of basin-wide escapement due to hooking mortality, and even low catch-and-release mortality may pose a problem for wild populations (Good *et al.* 2005a).

Within the San Francisco Estuary, green sturgeon are captured by sport fisherman targeting the more desirable white sturgeon, particularly in San Pablo and Suisun bays (Emmett *et al.* 1991). Green sturgeon are caught incidentally by sport fisherman targeting the more highly desired white sturgeon within the Delta waterways and the Sacramento River. All green sturgeon must be released unharmed and recorded on the sturgeon punch card by the angler.

Poaching rates of green sturgeon in the Central Valley are unknown; however, catches of sturgeon occur during all years, especially during wet years. Unfortunately, there is no catch, effort, and stock size data for this fishery, which precludes making exploitation estimates (USFWS 1995). Areas just downstream of Thermalito Afterbay outlet and Cox's Spillway, and several barriers impeding migration on the Feather River may be areas of high adult mortality from increased fishing effort and poaching. The small population of sturgeon inhabiting the San Joaquin River (believed to be currently composed of only white sturgeon) experiences heavy fishing pressure, particularly regarding illegal snagging and it may be more than the population can support (USFWS 1995).

In summary, the available information indicates that the level of winter-run Chinook harvest has remained the same, or declined since the status review in 2011 (NMFS 2011b) and that overutilization (harvest) is not likely to appreciably reduce winter-run abundance due to the regulatory actions that have been implemented since 2010 (*i.e*., control curve rules). For CV spring-run, CV steelhead, and green sturgeon harvest is minimal due regulatory restrictions.

2.5 Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

This section describes the direct and indirect effects of the proposed action on all of the listed species and designated critical habitat addressed in this BO. Our presentation of the effects on the species generally pertains to both the threatened and endangered species; ESU/DPS-specific effects are distinguished only when necessary and appropriate. Coho salmon, Chinook salmon, and steelhead are all salmonid species and will experience the project effects described below in a similar way. Because of this, the effects analysis is focused on effects to salmonids in general with additional analysis provided for sturgeon, eulachon, and abalone as appropriate.

The potential for a proposed project to have an adverse effect on listed species, their critical habitats, and/or EFH depends on a variety of factors, including, but not limited to, the conditions present in the 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. Because projects will occur in the future, and exact project descriptions needed to determine the precise effects of the proposed action on listed species and their habitats are limited or unavailable at this time, this assessment of effects is primarily qualitative, except where data are available. Given the scale of the action area and the nature of the activities, however, NMFS assumes the aggregate adverse effects described below will be low in intensity and severity. Our approach to assess effects is based on a review of ecological literature concerning the effects of loss and alteration of habitat elements important to anadromous fish and abalone, including water, substrate, food, and adjacent riparian areas, which are some of the PBF's of critical habitat that will be affected.

With regard to adverse effects on critical habitat, the proposed action is expected to affect certain PBFs, with the expected impacts for individual projects to vary from temporarily elevating turbidity concentration to temporarily dewatering discrete areas of streams. In this context, NMFS describes the effects to critical habitat and effects to the species. This section also evaluates the efficacy of the proposed avoidance and minimization measures.

NMFS expects that many of the effects of proposed action elements that will be covered programmatically (Framework Actions) would be similar to those effects analyzed below for Standard Actions. However, there may be Framework Actions with additional elements that are lacking sufficient information to analyze to the level of take at this time and are therefore not included in this summary of effects. Those activities are not expected to occur until further authorization and section 7 analysis is completed.

2.5.1 Effects to Species

The severity and intensity of the effects, in terms of changes in the condition of individual fish and abalone and the number of individuals affected, will vary somewhat between projects because of differences at each site in the scope of work area isolation and construction, the particular life history stages present, the baseline condition of each species present, and factors responsible for those conditions. We anticipate 106 or fewer projects will be completed in the NMFS' jurisditions of California, in a single year, as part of the proposed project (Table 3). The limits of coverage addressed in FEMA's Proposed Suitability Criteria (Section 1.3.7 and 1.3.8), limit project disturbance to 500 linear feet of stream bed or streambank or 0.5 acre of estuarine/marine waters. The intensity of those project effects is small when considered as a function of their average project footprint relative to the total streamside and/or estuarine/marine areas in California. Implementation of the program is expected to disturb up to 45,050 linear feet of streambed or streambank or up to 7.96 acres of estuarine/marine areas, partitioned between NMFS field office jurisdictions in a single year, within the action area.

The proximity of spawning adults, eggs, and fry of most salmon and steelhead species to any construction-related effects of projects completed under the proposed action that could injure or kill them will be limited by requiring work within the active channel to be isolated from that channel and completed in accordance with the attached guidelines for timing of in-water work (Appendix C) to protect fish and wildlife resources.

2.5.1.1 Erosion, Turbidity, and Sedimentation

All of the listed species addressed in this BO could potentially be affected by erosion, turbidity, and sedimentation; however, implementation of the avoidance and minimization measures in Section 1.3.9 would avoid or reduce these potential effects. Because the effects of short-lived fine-sediment releases from Program activities on critical habitat are somewhat uncertain, only a general characterization of the possible effects on listed species can be made. In general, increased erosion, turbidity, and sedimentation have the potential to adversely affect aquatic organisms in several ways, including reduced visibility of prey or forage items, respiratory stress, changes in temperature regimes, and in severe cases, damage to gills or other organs. During implementation of a proposed project, sediments may enter water bodies or become suspended in the water column through soil or substrate disturbances resulting from the use of heavy equipment, particularly during in-water work activities, such as the installation of temporary diversions or dewatering. This may include the deposition of construction-generated dust onto nearby waters and vegetation, and increased erosion and sedimentation during storm runoff resulting from terrestrial or riparian vegetation removal. These sediments may appear as localized increases in turbidity due to resuspension of fine sediments and may potentially result in burial of existing substrates when resuspended sediments settle. Turbidity increases may also occur when a water source reenters dewatered areas after the removal of work area isolation structures (e.g., cofferdams). Suspended sediment generated from pile driving or removal may also occur. The duration for the increased turbidity is dependent on several factors that include:

- The nature of vegetation, soils, and sediments in the action area;
- The flow or current velocities within the action area;
- The type of erosion-control structures installed at the action area;
- The amount of area that was originally disturbed and the local topography of the action area;
- The distance between the structure or activity and the water source, including the amount and type of filter materials (e.g., vegetation) in buffer areas; and
- The time duration and expected vegetation growth between the completion of the activity and onset of high flows or heavy rains.

Increases in erosion, turbidity, and sedimentation are likely to lead to under use of stream habitats, displacement from or avoidance of preferred rearing areas, or abandonment of preferred spawning grounds, which may increase losses to competition, disease, predation, or, for juvenile fish, reduce the ability to obtain food necessary for growth and maintenance (Moberg 2000;

Newcombe and Jensen 1996; Sprague and Drury 1969). However, the avoidance and minimization measures required of each project make it likely that fish would only vacate preferred areas temporarily and return quickly with negligible consequences to their fitness. Embryo development in salmonid redds downstream of construction sites is also expected to be impacted by fine-sediment releases. These short term effects are expected to occur in small localized areas for short durations of time, affecting a low proportion of individuals within the population. Adult and subadult green sturgeon are likely to be far less sensitive to suspended solids than salmonids. It is also reasonably certain that elevated suspended sediment concentrations will result in little to no behavioral and physical response due to the higher tolerance of green sturgeon, which usually inhabit much more turbid environments than do salmonids.

The use of the general construction avoidance and minimization measures described in Section 1.3.9 such as silt fences, sediment curtains, hay bales, and the dewatering of work areas would reduce the severity and duration of suspended sediment generated, and any remaining suspended sediment would resettle following the cessation of activities. In turn, these avoidance and minimization measures are expected to greatly reduce potential adverse effects to listed species, their prey, and their habitats downstream in a river or stream, or down current in a marine environment, of the activity. The avoidance and minimization measures would include seasonal work windows, restricting the entry of heavy equipment into waterbodies, and the establishment of upland staging areas for equipment and materials that would isolate sediment from waterbodies. Thus, the addition of fine sediment to streams and channels is expected to be minimal and cause short term, adverse behavioral effects to individual listed fish and abalone.

2.5.1.2 Potential Spills or Hazardous Materials

Potential spills or hazardous materials could potentially affect all of the listed species addressed in this consultation; however, implementation of the avoidance and minimization measures in Section 1.3.9 is expected to avoid or reduce this potential exposure. Chemical contamination of the water sources could occur from equipment leaks (e.g., diesel fuel, oil, hydraulic fluids, antifreeze), refueling spills, or an accidental spill during project implementation. Although proposed activities that occur in areas of known contamination are not covered under this BO, in-water work, such as pile-driving activities, sediment removal, and debris removal, may occur in areas of minor or unknown contamination, causing temporary decreases in local water quality. In the short term, removal of creosote or other piles treated with oil-based preservatives can release toxic preservatives into the surrounding water in the specific project area, resulting in a temporary degradation of water quality (Weston Solutions 2006). In the long term, removal of creosote piles will reduce water quality degradation.

Short-term effects of accidentally spilled hazardous material could include mortality of listed species, their prey, or plants that provide habitat if a high concentration of hazardous material causes suffocation or poisoning of listed species. Spilled hazardous materials could also injure listed species or their prey species without directly causing mortality through food web interactions. Long-term effects of spilled hazardous materials could include lingering elevated contaminant levels in soils and streambeds that could leach out and continue injuring or reducing reproductive success of listed species or their prey.

The implementation of avoidance and minimization measures would significantly reduce these hazards (Section 1.3.9). A Spill Prevention and Pollution Control Plan would be prepared to minimize the risk of spilled hazardous materials and other construction debris from entering soils and waterways. Equipment would be inspected daily for fuel leaks, any fuel leaks discovered would be immediately cleaned, wet cement and uncured concrete would not be allowed to enter waterways, stockpiled soils would be covered to prevent erosion, and all staging and hazardous material storage areas would be placed in upland areas that are paved, graveled, or otherwise non-erodible and away from water bodies. For proposed projects involving work over water, measures would be taken to ensure that construction debris is contained and does not fall into the water. Therefore, with the implementation of the proposed avoidance and minimization measures described above, potential spills or hazardous materials are not expected to cause adverse affects to individual listed fish or abalone species in the action area.

2.5.1.3 Noise and Sound Pressure

All of the listed fish species addressed in this BO could potentially be affected by activities creating noise and sound pressure. Pile driving, in-water drilling, cutting, or excavation can have adverse effects on the listed fish species by increasing in-water noise and vibration. Pile driving often generates intense sound pressure waves that can injure or kill fish (Reyff 2003, Abbott and Bing-Sawyer 2002, Caltrans 2001, Longmuir and Lively 2001, Stotz and Colby 2001). The type and size of the pile, the firmness of the substrate into which the pile is being driven, the depth of water, and the type and size of the pile-driving hammer all influence the sounds produced during pile driving. Fishes with swim bladders (including salmon and steelhead) are sensitive to underwater impulsive sounds, *i.e.*, sounds with a sharp sound pressure peak occurring in a short interval of time, (Caltrans 2001). As the pressure wave passes through a fish, the swim bladder is rapidly squeezed due to the high pressure, and then rapidly expanded as the under pressure component of the wave passes through the fish. The pneumatic pounding may rupture capillaries in the internal organs as indicated by observed blood in the abdominal cavity, and maceration of the kidney tissues (Caltrans 2001). The injuries caused by such pressure waves are known as barotraumas, and include hemorrhage and rupture of internal organs, as described above, and damage to the auditory system. Death can be instantaneous, can occur within minutes after exposure, or can occur several days later.

Fish respond differently to sounds produced by impact hammers than to sounds produced by vibratory hammers. Fish consistently avoid sounds like those of a vibratory hammer (Enger *et al.* 1993; Dolat 1997; Knudsen *et al.* 1997; Sand *et al.* 2000) and appear not to habituate to these sounds, even after repeated exposure (Dolat, 1997; Knudsen *et al.* 1997). On the other hand, fish may respond to the first few strikes of an impact hammer with a startle response, but then the startle response wanes and some fish remain within the potentially harmful area (Dolat 1997). Compared to impact hammers, vibratory hammers make sounds that have a longer duration (minutes vs. milliseconds) and have more energy in the lower frequencies (15-26 Hz vs. 100-800 Hz) (Würsig, *et al.* 2000).

A multi-agency work group identified criteria to define sound pressure levels where effects to fish are likely to occur from pile driving activities (Hydroacoustic Working Group, 2008). These thresholds, however, represent the initial onset of injury, and not the levels at which fish will be severely injured or killed. The most harmful level of effects is where a single strike generates peak noise levels greater than 206 dB_{peak}[12] where direct injury or death of fish can occur. Besides peak levels, sound exposure levels (SEL) (the amount of energy dose the fish receive) can also injure fish. These criteria are either 187 dB_{SEL} for fish larger than 2 grams or 183 dB_{SEL} for fish smaller than 2 grams for cumulative strikes (Hydroacoustic Working Group, 2008). In addition, any salmonid within a certain distance of the source (*i.e.* the radius where the root mean square (RMS) sound pressure level will exceed 150 dB_{RMS}) will be exposed to levels that change the fish's behavior or cause physical injury (*i.e.* harm). The result of exposure could be a temporary threshold shift in hearing due to fatigue of the auditory system, which can increase the risk of predation and reduce foraging or spawning success (Stadler and Woodbury, 2009). When these effects take place, they are likely to reduce the survival, growth, and reproduction of the affected fish. As black abalone lack a swim bladder and have other physiological differences from fish, underwater noise from pile driving is not expected to cause injury or behavioral effects to black abalone.

ESA-listed salmonids occur year-round in waters covered by this BO. The likelihood of injury or death, however, resulting from pile driving and removal will be minimized by completing the work during preferred in-water work windows, using a vibratory hammer where possible, using sound attenuators where an impact hammer is necessary, and limiting the number of strikes per day. Impact pile driving will result in sound increases greater than 150 dB that will degrade the fish passage within line of sight measured through water of the pile. Sound pressure levels generated from impact driving with a bubble curtain are expected to be below the instantaneous injury threshold of 206 dB_{peak}, thus there is little potential for an instantaneous injury from single strike peak pressure to juvenile or adult salmonids. Cumulative injury to salmonids is possible above 187 dB_{SEL} for salmonids weighing greater than 2 grams, and above 183 dB_{SEL} for salmonids weighing 2 grams or less.

FEMA anticipates a total of 25 pile driving projects may be funded over the life of this five-year programmatic consultation. For projects that result in adverse impacts to listed species as a result of underwater noise, we expect the effects would be limited to temporary threshold shifts to hearing and harassment or temporary behavioral changes. A small number of juveniles may exhibit a behavioral response that could lead to changes in movement or feeding, leading to increased predation and reduced fitness, survival, and growth. The impacts from these activities are not expected to result in a change at the population level.

2.5.1.4 Dewatering, Capture, and Relocation of Listed species

All of the listed fish species addressed in this BO could potentially be affected by activities requiring dewatering, capture and fish relocation. Most direct, lethal effects of authorizing and carrying out the proposed actions are likely to be caused by the isolation of in-water work areas, though lethal and sublethal effects would be greater without isolation. Any individual fish present in the work isolation area will be captured and released. Fish that are transferred to holding tanks can experience trauma if care is not taken in the transfer process, and fish can experience stress and injury from overcrowding in traps, if the traps are not emptied on a regular

[12] dB_{peak} is referenced to 1 micropascal (re: 1µPa or one millionth of a pascal) throughout the rest of this document. A pascal is equal to 1 newton of force per square meter).

basis. The primary contributing factors to stress and death from handling are differences in water temperature between the river where the fish are captured and wherever the fish are held, dissolved oxygen conditions, the amount of time that fish are held out of the water, and physical trauma.

In many cases, dewatering, capture, and relocation reduces the magnitude of harm to listed species when compared to conducting in-water work without dewatering. The effects of dewatering and fish relocation would be minimized by following the avoidance and minimization measures as presented in Section 1.3.9. Capture and relocation would only be conducted by qualified biologists, using the most recent NMFS guidelines for fish or abalone relocation methods.

For proposed projects involving in-water work, dewatering may be necessary to properly install structures, reduce turbidity, and reduce the potential for direct injury to listed species. For projects where the diversion of continued stream flow is needed, conveyance by gravity through a temporary cofferdam and pipe system is the proposed preferred method, but pumps may be needed to move water in some instances. If pumps are used, the pump would be properly screened to prevent entrainment of listed fish species as described in Section 1.3.9. Temporary dewatering structures would be left in place for the minimum amount of time necessary for construction to allow fish to return to the habitat and/or continue migration. Dewatering of spawning habitat for listed species would not take place during spawning periods to avoid potentially exposing eggs and larvae to desiccation and dramatically reducing reproductive success.

Although FEMA proposes measures to minimize effects due to dewatering and fish relocation, we expect injury and mortality to a small number of juvenile salmonids, green sturgeon, and eulachon. McMicheal *et al.* (1998) estimates some injury or mortality of approximately 5 percent of relocated individuals, depending on conditions and the size of the fish affected. These fish would be lost from small localized areas within different watersheds throughout the action area and represent small proportions of the entire populations.

2.5.1.5 Effects on Fish Movement and Behavior

All of the listed fish species addressed in this BO could potentially be affected by projects that cause temporary effects on fish movements; however, implementation of the avoidance and minimization measures in Section 1.3.9 are expected to avoid or reduce these potential effects. These effects are generally not applicable to black abalone because this species does not make long-distance movements as part of its adult life cycle.

Rapid changes and extremes in environmental conditions caused by construction are likely to cause a physiological stress response that will change the behavior of salmon and steelhead (Moberg 2000; Shreck 2000). For example, reduced input of particulate organic matter to streams, the addition of fine sediment to channels, and mechanical disturbance of shallow-water habitats are likely to lead to under use of stream habitats, displacement from or avoidance of preferred rearing areas, or abandonment of preferred spawning grounds, which may increase losses to competition, disease, predation, or, for juvenile fish, reduce the ability to obtain food necessary for growth and maintenance (Moberg 2000; Newcombe and Jensen 1996; Sprague and Drury 1969).

In-water work has the potential to cause temporary disruptions in fish movement and behavior. Project-related underwater noise and disturbance resulting from in-channel work, as described in Section 2.5.1.4, may cause behavioral changes in listed fish species, such as dispersal or avoidance behavior, which could temporarily disrupt normal movements. Increases in turbidity and sedimentation due to project activities, as described in Section 2.5.1.1, could impair visibility and navigation, thereby affecting movement. Disturbance to or removal of stream habitat features (e.g., vegetation, large woody debris, boulders, gravel) could discourage fish from attempting to move through the disturbed stream section or increase the chance of predation during movement. If temporary dewatering of a channel is required, fish may avoid or be unable to make movements through bypass pipes or secondary channels. Projects that affect stream channel widths are also likely to impair local movements of juvenile fish for hours or days, and downstream migration may be similarly impaired. Fish may compensate for, and adapt to, some of these perturbing situations so that they continue to perform necessary physiological and behavioral functions, although in a diminished capacity. However, fish that are subject to prolonged, combined, or repeated stress by the effects of the action combined with poor environmental baseline conditions will likely suffer a metabolic cost that will be sufficient to impair their rearing, migrating, feeding, and sheltering behaviors and thereby increase the likelihood of injury or death.

While the extent of some of these project components, such as dewatering, are difficult to predict, such temporary, construction-related disruptions in fish movement and migration (including dewatering) are expected to be avoided or minimized by implementing the measures described in Section 1.3.9, which include deploying erosion control materials to prevent increases in turbidity, avoiding disturbance to stream habitat when possible, and working outside of fish migration windows.

As described in Sections 1.3.7, FEMA's Proposed Suitability Criteria does not cover proposed projects that would alter culverts and other water crossings in a manner that reduces the ability to pass migrating fish. A project may require work on existing fish passage barriers, which include total fish passage barriers, such as dams lacking fish passage structures and narrow, perched culverts that spill onto concrete aprons, as well as partial fish passage barriers, such as steep culverts, seasonal barriers, or impediments that slow, but do not necessarily prevent passage. As described in the proposed action, any project involving modifications to an existing fish passage barrier will include design features to improve fish passage around the barrier. Therefore, proposed projects covered under the BO are not expected to have permanent adverse effects on fish migration.

The small reduction in the growth and survival of fish, primarily juveniles, as a result of behavioral and movement changes is expected to be relatively low in intensity and severity thus, any adverse effects to fish growth and survival are likely to be inconsequential.

2.5.1.6 Invasive Species and Pathogens

Any of the listed species addressed in this BO could potentially be affected by invasive species and pathogens. In general, there is potential for invasive species or pathogens to be introduced to previously uninvaded areas during implementation of a proposed project.

During land-based construction, invasive species and pathogens are most typically introduced to an area when contaminated construction equipment is moved from a site containing the invasive species or pathogen to an uninvaded site. Seeds, propagules, and pathogens embedded in mud, soil, or other debris on construction equipment can fall into the soil or water of the uninvaded site. Invasive species and pathogens may also be transferred to an uninvaded site via construction materials or on the clothing or boots of those working at the site. During in-water work, invasive species and pathogens can be introduced to a water body if vessels are inadequately cleaned prior to transfer between invaded and uninvaded sites. Water-borne invasive species and pathogens are also commonly introduced via ballast or bilge water discharge. Plant pathogens may be introduced on construction equipment or on nursery plant material used in revegetation. Once introduced, invasive species can affect listed species through resource competition and predation. Pathogens can directly injure or kill listed species, or indirectly harm listed species by reducing prey abundance or detrimentally affecting aquatic and riparian vegetation.

The risk of spreading invasive species and pathogens is expected to be reduced by implementing avoidance and minimization measures as described in Section 1.3.9. Construction equipment, clothing, waders, and boots should be properly cleaned prior to moving between work sites, particularly if the prior work site is known to contain invasive species or pathogens. Discharge of ballast water will adhere to the U.S. Coast Guard's Standards for Living Organisms in Ships' Ballast Water Discharged in U.S. Waters (77 FR 17254). Therefore, the potential for introduction of invasive species and pathogens is not anticipated to occur and is not expected to result in adverseeffects to individual fish/abalone within the action area.

2.5.2 Effects to Critical Habitat

Projects covered by this BO, completed as proposed, including full application of the avoidance and minimization measures, are likely to have the following effects on critical habitat. These effects will vary somewhat in degree between actions because of differences in the scope of construction at each site, and in the current condition of PBFs and the factors responsible for those conditions.

We anticipate 106 or fewer projects will be completed in the NMFS' jurisditions of California, in a single year, as part of the proposed project (Table 3). The limits of coverage addressed in FEMA's Proposed Suitability Criteria (Section 1.3.7 and 1.3.8), limit project disturbance to 500 linear feet of stream bed or streambank or 0.5 acre of estuarine/marine waters. The intensity of those project effects is small when considered as a function of their average project footprint relative to the total streamside and/or estuarine/marine areas in California. Implementation of the program is expected to disturb up to 45,050 linear feet of streambed or streambank or up to 7.96 acres of estuarine/marine areas, partitioned between NMFS field office jurisdictions in a single year, within the action area.

Because the area affected for individual projects is small, the intensity and severity of the effects described is relatively low, and their frequency in a given watershed is very low, PBF conditions and conservation value of critical habitat at the site level or reach level are likely to quickly return to, and in some cases, improve beyond, critical habitat conditions that existed before the proposed action. This is because most actions are likely to partially or fully correct improper or inadequate engineering designs in ways that will help to restore habitat. Improved fish passage, in particular, may have long-term beneficial effects.

2.5.2.1 Riparian Habitat Removal and/or Degradation

For all the listed species addressed in this consultation, their respective designated critical habitat could potentially be affected by riparian habitat removal and/or degradation; however, implementation of the avoidance and minimization measures in Section 1.3.9 is expected to avoid or reduce these potential effects to habitat. In general, proposed projects may require modification to riparian vegetation within the footprint of repaired or modified facilities, vegetation management, water crossings, or other project areas. Some proposed projects may also require the trimming or removal or riparian vegetation for temporary access during construction. These modifications may be short-term (e.g., during construction only) or long-term.

The short-term removal of riparian vegetation may reduce prey availability and increase predation due to reduced cover. In addition, removal of vegetation, especially riparian shade trees, may remove thermal refugia and result in an incremental increase in water temperature. The long-term removal of riparian vegetation could result in reduced in-stream habitat quality and riparian habitat complexity, increased water temperatures, decreased trophic input from terrestrial sources, decreased floodwater and stormwater attenuation, and increased potential for erosion and sedimentation in the cleared riparian areas. Higher water temperatures can cause stress to anadromous fish and allow warm water fish species, which may compete with or prey upon salmonids, to establish residence (EPA 2001).

Furthermore, the removal of riparian vegetation can reduce the amount of large woody debris that enters into aquatic habitat. Large woody debris in the stream helps retain gravel for spawning habitat, create pools and habitat complexity, provide long-term nutrient storage and substrate for aquatic invertebrates that listed fish may prey upon, and provide refuge for fish and prey during high- and low-flow periods (Spence *et al.* 1996).

The likelihood and severity of these effects related to riparian habitat removal and/or degradation of designated critical habitat occurring is largely dependent on the quality and quantity and nature of riparian habitat affected. The potential for such effects occurring increases as the size of riparian habitat affected increases. As described in Avoidance and Minimization Measures (AMM-24), revegetation of stream and riverbanks would be required by FEMA when proposed projects remove riparian vegetation during construction activities. With the establishment of a 3:1 ratio replacement rate, riparian habitat in the action area is expected to return to pre-project conditions within a short time frame (approximately five years). This interim period of regrowth is expected to result in the short-term adverse effects described above to the rearing and migratory corridor PBFs of designated critical habitat.

2.5.2.2 Effects of Streambed, Bank, and Shoreline Modification

Designated critical habitat in freshwater and estuarine areas included in this BO could potentially be affected by changes caused by streambed, bank, and shoreline modification. However, implementation of the avoidance and minimization measures in Section 1.3.9 would avoid or reduce these potential effects. Streambed, bank, and shoreline modification can cause a decrease in infiltration, reducing stream flows during the summer by reducing the interception, storage, and release of ground water that affects habitat availability and productivity, particularly for those species that have extended freshwater rearing requirements (e.g., steelhead).

Many actions authorized or carried out under this opinion will seek to install rock or other hard structures within a functional floodplain to stabilize a streambank or channel and reduce erosion. The impacts of hardening the interactive floodplain include direct habitat loss, reduced water quality, upstream and downstream channel impacts, reduced ecological connectivity, and the risk of structural failure (Barnard *et al.* 2013; Cramer 2012; Fischenich 2003; NMFS 2011d; Schmetterling *et al.* 2001).

The addition of impervious surfaces within a watershed may also result in permanent effects to the habitat quality and hydrology of the stream or estuary. The expansion of impervious surfaces can increase both the volume of surface runoff and the peak rate of flow resulting from a storm event. The magnitude of stream discharge can strongly influence substrate and channel morphology. Increased peak runoff from impervious surfaces may cause stream bank erosion and channel scouring. Sediment from eroded and unstable stream banks may be deposited downstream, filling pools and altering substrate characteristics. The alteration in quantity and timing of surface run-off may also accelerate the downstream transport of wood. This results in simplified stream channels and greater instability, which reduces habitat value for fish (Spence *et al.* 1996). Similarly, the armoring of shorelines and stream banks and the deepening of channels may reduce overall habitat complexity, increase flow velocities, and affect stability of downstream banks.

Upstream and downstream channel effects occur when bank and channel hardening and channel narrowing alter stream velocity. Downstream, loss of stream roughness and channel narrowing causes water velocity and erosion to increase. Upstream, channel narrowing reduces water velocity and leads to backwater effects during high flows that typically result in upstream deposition (Lagasse, Schall and Richardson 2001). Then, when flows recede, erosion occurs around or through the new deposition. Thus, a hardened bank or channel creates chronically unstable conditions that increase bed and bank erosion upstream and downstream.

The effects caused by streambed, bank, and shoreline modification are expected to be avoided or minimized by implementing the measures described in Section 1.3.9. These measures include avoiding placement of roads, staging areas, and other facilities adjacent to streambank and stream channel habitat as much as possible and returning contours of the creek bed, vegetation, and creek flows to pre-construction condition or better after the completion of work. Designing projects to minimize the creation of new impervious surfaces and incorporating bioengineering and living shorelines techniques may also be used. Although measures to avoid and minimize will be implemented, adverse effects to the rearing and migratory corridor PBFs from bank repair projects are expected to occur, and only small, localized portions of critical habitat in the action area will have their value for conservation reduced.

2.5.2.3 Alteration of Shallow Water Critical Habitat

Designated critical habitat in riverine and estuarine areas could potentially be affected by permanent loss or alteration of shallow water habitat. However, implementation of the avoidance and minimization measures in Section 1.3.9 is expected to generally avoid or reduce potential effects to shallow water habitat. The spawning, rearing, and migratory corridor PBFs in both riverine and estuarine areas rely on sufficient shallow water habitat to provide adequate substrate for refuge, foraging, redd creation, and juvenile development. Riffles containing suitably sized gravel are important for salmonid spawning PBFs, and coastal shallow water habitat contains essential PBF's for all life stages of black abalone.

Proposed activities may include installing or expanding jetties, groins, breakwaters, and revetments to protect against high rates of erosion or wave activity. This may permanently reduce the amount of shallow water habitat available. Installation of rock or structures such as breakwaters, jetties, groins, and revetments can lead to habitat alterations such as, capturing large woody debris, reducing available rocky substrate for juvenile black abalone settlement, or otherwise inhibiting the movement of energy and material, and also reducing ecological connectivity by eliminating shallow water habitat.

The over-excavation of excess substrate from constructed channels, ditches, and stream and river channels in response to accumulation from disaster events deepens waters to below pre-disaster depths and eliminates shallow water habitat. This chronic source of bed removal is a major cause of channel instability and loss of sturgeon spawning and rearing habitat for long distances upstream and downstream, and is a source of mechanical disturbance in bays, estuaries, and lower elevation mainstem reaches where sturgeon occur. The limits of coverage established in the Suitability Criteria (Section 1.3.7), however, prohibit any new or maintenance dredging of channels, open water bays, or estuaries; although, projects that involve the removal of disaster-related sediment or debris from waterways may occur.

The creation or expansion of overwater and in-water structures, such as bridges and wharves, may create cover for predatory species and migration obstacles for juvenile and adult migrating listed fish species, which must expend additional energy to avoid these structures. In other cases, the removal of aquatic or overhanging vegetation may reduce cover and habitat complexity for listed fish species. Accumulation of woody debris in shallow waters can create hazardous conditions, such as after a flood event, necessitating the removal of material that otherwise contributes to complex habitat.

Dewatering of the isolated work areas may also alter shallow water critical habitat by drying out the substrate in that area, reducing the risk of exposure of streams to sediment and chemical contaminants resulting from construction activities. However, macro-invertebrates residing in the isolated work areas will die as the area dries out, resulting in temporarily reduced forage value for fish (Cushman 1985). Rapid recolonization, however, is expected after re-watering. Drift of food from upstream sources would be available immediately, thus the adverse effects of dewatering as a result of decreased food availability are expected to be limited to the period of the dewatering event. Isolation would occur during the summer approved in-water work period.

The limits of coverage established in this BO prevent large areas of shoreline or shallow waters from being altered in ways that would have substantial negative effects on listed species' designated critical habitat (see Section 1.3.7 and 1.3.8). Project designs to minimize the creation of new impervious surfaces and the agency recommended techniques on bioengineering and living shoreline techniques will also be used, as applicable. Adverse effects, however, to rearing, spawning, and migratory PBFs from alternations to shallow water habitat, as discussed above, are expected to occur in small, localized portions of critical habitat within the action area.

2.5.2.4 Permanent Loss or Alteration of Mid-Channel Critical Habitat

Mid-channel or deeper marine water portions of designated critical habitat could potentially be affected through permanent loss or alteration. However, implementation of the avoidance and minimization measures in Section 1.3.9 is expected to avoid or reduce these potential effects. Listed species may rely on sufficient mid-channel or deeper marine water habitat for migration, foraging, and refugia in riverine, estuarine, and marine areas. Similarly, mid-channel areas of rivers and streams are used as spawning areas where the substrate and hydrology are appropriate for fish species, such as green sturgeon and eulachon (Seesholtz et. al. 2014, NMFS 2010a).

The replacement or placement of culverts, bridge supports, or structures related to boat navigation may affect mid-channel habitat. The creation or expansion of in-water structures may create velocity refugia for predatory species and alter the movement of sediment in the channel. The removal of large woody debris, which may be necessary to repair unstable banks or remove debris that is causing flooding, may also reduce the complexity of mid-channel habitat. The placement of fill or changes to substrate type in marine waters up to 6 meters below mean lower-low water (76 FR 66806) may reduce the suitability of foraging, rearing, and spawning habitat for black abalone, particularly if areas of rock crevices are affected.

The limits of coverage established in FEMA's Proposed Suitability Criteria prevent large areas of mid-channel habitat (including spawning areas) from being altered in ways that have substantial negative effects on listed species' designated critical habitat (see Section 1.3.7). The proposed projects that do involve habitat alterations are expected to have short-term adverse effects on a small proportion of critical habitat within the action area.

2.5.2.5 Beneficial Effects to Critical Habitat

Proposed projects may have a variety of long-term beneficial effects to critical habitat PBFs, such as rearing, spawning, and migratory corridors. Beneficial effects may include stabilizing eroding banks, reducing sedimentation and turbidity in the water column, and replacing or removing structures that form partial or complete migration barriers with structures that improve fish passage or connectivity. Existing structures may also be modified or replaced in ways that provide shade and cover, reduce refugia for predators, replace hardened shorelines with living shoreline structures, improve hydrologic function of stream channels, or increase porosity of previously impervious surfaces. For example, overall beneficial effects would result from the replacement of an undersized, hanging culvert with an open bottom culvert as it would improve fish passage and allow better transport of substrate through the culvert. The guidelines on bioengineering and living shorelines techniques provide details on how projects may replace hardened waterway structures with structures that improve rearing and migratory corridor PBFs such as water quality, substrate, and natural cover of designated critical habitat for listed species.

2.5.3 Summary of Effects to Species and Critical Habitat

Table 3. Summary of effects to species and critical habitat.

Anticpated Effect/Impact	Program Activity	Duration of Impact	Severity of Impact	Rationale for Anticipated Effect/Impact	Habitat Response	Salmonid Response	Green Sturgeon Response	Black Abalone Response
Erosion, Turbidity, and Sedimentation	1, 2, 3, 4	Temporary, duration of activity	Moderate	Exposed soil, increased potential for sedimentation	Fine sediment fouling & rearing sites	Migration, avoidance, impaired embryo development & impaired juvenile feeding	Migration avoidance	Reduced larval settlement
Potential spills or hazardous materials	1, 2, 3, 4	Temporary	Low	Exposed contaminated sediment, equipment leaks or accidental spills	Temporary reduction in habitat quality	Avoidance, unsuccessful reproduction, impaired embryo development	Avoidance, unsuccessful reproduction, impaired embryo development	
Noise and sound pressure	2, 3	Temporary, duration of activity	Low-High	Pile driving, in-water drilling, cutting, or excavating	Temporary increase in in-water noise	Avoidance, barotrauma, or possible death	Avoidance, barotrauma, or possible death	
Dewatering, capture and relocation of fish	2, 3	Low flow season	Moderate-High	Reduce the potential for direct injury to federally listed fish species	Reduction in habitat quantity & quality	Avoidance, handling stress, possible death	Avoidance, handling stress, possible death	Not likely to impact
Temporary or permanent effects on migration or fish movement	1, 2, 3, 4	Temporary or permanent	Low	Temporary barriers may be installed during construction. Any permanent effects to fish movement must be beneficial/facilitate migration	Reduction in ability for fish to access habitat	Temporary barriers to fish movement during construction; long-term benefits to migration corridors	Temporary barriers to fish movement during construction; long-term benefits to migration corridors	NA
Riparian habitat removal and/or degradation	1, 2, 3, 4	Temporary loss. Removed vegetation would be replaced at a 3:1 ratio with an 80 percent planting survival 5 years after planting	Low	Access routes & heavy equipment	Loss of stream shading & thermal refugia, increased erosion and sedimentation	Heat stress, redistribution, decreased quality spawning & rearing habitat, decreased foraging opportunities	Heat stress, redistribution, decreased quality spawning & rearing habitat,	Not likely to impact
Streambed, bank, and shoreline m odification	2, 3	Continuous	Moderate	Shoreline armoring and expansion of impervious surfaces	Bank failure, loss or habitat access, poor water quality, alteration to PCEs	Redistribution, restricted seasonal movements, decreased quality spawning habitat, stranding, heat stress	Loss of quality spawning, rearing, foraging, and migration habitat; stranding; heat stress	Not likely to impact

Anticpated Effect/Impact	Program Activity	Duration of Impact	Severity of Impact	Rationale for Anticipated Effect/Impact	Habitat Response	Salmonid Response	Green Sturgeon Response	Black Abalone Response
Invasive species and pathogens	1, 2, 3, 4	Permanent	Low	Personnel and equipment bringing invasive species and pathogens into contact with listed species and/or critical habitat	Invasive species and pathogens can exceed habitat sustainability threshold and degrade habitat quality for listed species	Death or injury to species from direct contact with invasives or pathogens, or indirectly due to habitat degradation	Death or injury to species from direct contact with invasives or pathogens, or indirectly due to habitat degradation	Death or injury to species from direct contact with invasives or pathogens, or indirectly due to habitat degradation
Loss or alteration of shallow water habitat	1, 2, 3	Temporary - permanent	Moderate	Bank stabilization activities could remove shallow water habitat, Creation or expansion of in-water structures	Reduction in refuge, foraging, spawning, rearing habitat for listed fish species	Increased risk of predation; decrease in quantity and quality of spawning, rearing, and foraging habitat; increased water temperatures; Reduction in feeding opportunities	Increased risk of predation; decrease in quantity and quality of spawning, rearing, and foraging habitat; increased water temperatures; Reduction in feeding opportunities	Reduced larval recruitment and settlement
Loss or alteration of mid-channel habitat	1, 2, 3	Temporary - permanent	Moderate	Creation or expansion of in-water structures	Reduction in habitat for mitigation, foraging, refugia, and spawning areas	Increased risk of predation; decrease in habitat quantity and quality for spawning, rearing, refugia, foraging, and migration	Reduced availability of foraging substrate; decrease in habitat quantity and quality for refugia, migration, spawning, and rearing	

Key to Program activities are as follows:
1 = Non-Emergency Debris Removal;
2 = Constructing, modifying, or Relocating Facilities;
3 = Actions Involving Watercourses and Coastal Features; and
4 = Wildfire Risk Reduction.

2.6 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The most common future State, tribal, local, or private activities reasonably certain to continue to occur in the Action Area are agricultural activities, residential/urban development, recreational activities, timber harvest, road construction and maintenance, gravel/rock/metals mining, commercial fishing, and infrastructure development, which are described in the environmental baseline (Section 2.4). The NMFS assumes that future private, State, and tribal actions will continue increasing within the action area as the population rises.

Urban development will likely increase the amount of impervious surfaces within some of the watersheds, which is expected to raise the potential for dry and wet season run off and input of potentially toxic elements in anadromous streams. Flood control activities may reduce riparian vegetation, alter stream hydraulics and geomorphology, and impede successful migration. Increased urbanization is expected to cause elevated rates of treated wastewater releases to streams which can increase nitrogen loads and result in adverse effects on aquatic organisms. Residential growth on or along floodplains of rivers is expected to disrupt fluvial processes resulting in the loss of instream habitat and riparian vegetation. Agricultural development is expected to increase runoff and water usage which may increase the input of fertilizers, herbicides, and pesticides into streams. New surface and groundwater withdrawals in the action area are expected to translate into decreased living space for anadromous fish. Ongoing mining activities will likely modify stream channel geomorphology and increase runoff of fine sediments into streams. Coastal development will likely contribute to coastal erosion and loss of viable habitat for black abalone.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the Action Area's future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the status of the species (Section 2.2).

Based on the wide geographic scope and the duration of the proposed action, future State, tribal, local, or private activities that could cumulatively affect the federally listed species covered in this BO are expected to occur statewide, however, it is not possible to predict the future intensity of specific non-Federal actions at this program scale.

2.7 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminishes the value of designated or proposed critical habitat for the conservation of the species.

2.7.1 Synthesis of the Analysis on Listed Species Populations and Critical Habitat

The action area for this program extends throughout the entire state of California, and contains the following listed species: green sturgeon, coho salmon, steelhead, Chinook salmon, euchalon, and black abalone. As described in the Status of the Species (Section 2.2), populations of the above listed species have all experienced significant declines in abundance and available habitat in California, relative to historical conditions. The current status of listed species within the action area, based on their risk of extinction, has not significantly improved since their listing (see Section 2.2), and the severe decline in populations of listed species, coupled with the degraded environmental baseline (Section 2.4), demonstrates the need for actions that will assist the recovery of all ESA-listed species in the action area. According to the most recently released status review for listed salmonids, most salmonid species in the action area have experienced little to no change in extinction risk since the previous status reviews, but climatic conditions in California in recent years have increasingly contributed to negative impacts encountered by such species. Climatic conditions in the past few years have caused exceptionally high air, stream, and upper-ocean temperatures, which have all had negative effects on all freshwater, estuary, and marine phases for many populations of Chinook salmon, coho salmon, and steelhead (Williams *et al*. 2016). If actions are not taken to reverse current trends, the listed species in the program action area will continue to be at risk. As described in the analysis of the effects of the action (Section 2.5), the effects of the proposed action will cause only short-term, localized, and minor effects to listed species populations in the action area.

Currently, accessible aquatic habitat throughout the action area has been severely degraded, and the condition of PBFs of designated critical habitats, specifically their ability to provide for long-term conservation, has also been degraded from conditions known to support viable populations. Coastal development has contributed to coastal erosion and loss of viable habitat for black abalone, and intensive land and stream manipulation during the past century has modified and eliminated much of the historic anadromous habitat in California. Logging throughout central and northern California has caused widespread increases in sediment delivery to channels through both increased landsliding and surface erosion from harvest units and log decks. Much of the riparian vegetation habitat has been removed, reducing future sources of LWD. Agriculture in the Central Valley degraded valuable habitat through the construction of the massive levee system in the 19th an early 20th centuries. The proliferation of urban areas within many of the coastal watersheds throughout southern California has caused reductions in the quality of critical habitat and abundance of desirable aquatic species, and increased eutrophication of receiving waters such as estuaries and streams (Weaver and Garman 1994, Bowen and Valiela 2001, Quist *et al.* 2003). Today, these problems are further exacerbated by climatic conditions, including below average precipitation, high surface air temperatures and low snowpack. While historically salmonids have been able to adapt to changing climatic conditions, their ability to do so now is quite limited due to reductions in population size, habitat quantity and diversity, and loss of behavioral and genetic variation (Williams *et al*. 2016). Cumulative effects (described in Section 2.6) are likely to add to these effects on salmon, steelhead, eulachon, green sturgeon, and black abalone population abundance, productivity, and spatial structure.

This program involves work in critical habitat for listed species of green sturgeon, coho salmon, steelhead, Chinook salmon, euchalon, and black abalone, which is expected to contribute to the degraded habitat of each species. Implementation of the program is expected to disturb up to 45,050 linear feet of streambed or streambank or up to 8.56 acres of estuarine/marine areas, partitioned between NMFS field office jurisdictions in a single year, within the action area, potentially affecting all listed species and their critical habitat. Implementation of these projects in areas occupied by these listed species have the potential to subject the species to an elevated exposure risk for a range of direct and indirect effects depending on the program activity, described in section 2.5. Proposed avoidance and minimization measures, however, within the program are expected to significantly reduce the potential risk and/or degree of impact for many of these effects.

Adverse effects to species and their critical habitat are expected in the form of short-term behavioral changes with a minimal amount of mortality. Increases in erosion, turbidity, and sedimentation are expected to lead to under temporary displacement from or avoidance of preferred rearing areas. The release of fine sediment from construction related activities is expected to cause adult fish to temporarily avoid spawning in those areas and short-term effects to juvenile feeding behavior. Also, embryo development in salmonid redds downstream of construction sites is expected to be impacted by fine-sediment releases. Construction within instream and channel habitat is expected to create barriers to fish passage that restrict seasonal movement or result in loss of aquatic habitat. Underwater noise activities is expected to result in harassment or cause temporary behavior modification, resulting in reduced fitness, survival, and growth. Riparian habitat removal is expected to reduce prey availability, increase predation due to reduced cover, and reduce thermal refugia. Changes in hydrology caused by streambed, bank, and shoreline modification is expected to change channel morphology, alter flow velocities, and affect stability of downstream banks. FEMA's proposed avoidance and minimization measures, however, are expected to significantly reduce the potential risk and/or degree of impact for many of these effects, such that there is a low probability of exposure, to a low proportion of individuals within a population.

The highest expected exposure to direct effects is for those projects that involve dewatering of the stream channel and would require the capture and relocation of stranded fish from these areas, which may result in injury or death. A few stranded individuals may not be relocated in time and will likely become mortalities. Overall, these fish would be lost from small localized areas within different watersheds throughout the action area and represent a small proportion of the entire population. Therefore, it is unlikely that the low level mortality of individual fish that NMFS anticipates from relocation activities, stranding, and reduced egg survival, will result in a change to the viability of a particular population.

Generally, projects authorized through this consultation are expected to be designed and implemented consistent with standard techniques and avoidance and minimization measures of the proposed project, including NMFS' fish passage and screening guidelines, which is expected to greatly minimize adverse effects on the listed species and their critical habitats. No project will have effects on the listed species that are beyond the full range of effects described. The effects of some of the proposed action are also reasonably certain to result in some degree of ecological recovery due to the requirements for bioengineered bank treatments and fish passage where it may have been partial or nonexistent before.

Effects of interrelated and interdependent actions that are reasonably certain to occur include the continued operation and maintenance of structures and facilities included in the proposed action.

The operation and maintenance activities and level of effects will vary with the type and purpose of the structure or activity completed. The specific effects from these activities is difficult to identify within the context of this mixed-framework programmatic consultation. The requirement for NMFS review of each project will allow for site specific evaluation as to the appropriateness of the activity as it affects listed fish and abalone, and their habitats.

The programmatic nature of the action prevents a precise analysis of each action that eventually will be funded or carried out under this BO, although each type of action must be carried out following the carefully designed suitability criteria and avoidance and minimization measures. The application of the AMMs to each action then, ensures that environmental outcomes of each activity can be readily predicted in a manner than enables a comprehensive synthesis of the effects of carrying out the program across the action area. As described the analysis of effects of the action (Section 2.5), the effects of the proposed activities will cause only short-term, localized, and minor effects

2.7.2 Discussion of Effects at the ESU/DPS Level

In this section we discuss and analyze the above described effects at the ESU/DPS level.

2.7.2.1 Coho salmon (Oncorhynchus kisutch)

Coho salmon populations throughout the action area have shown a dramatic decrease in both numbers and distribution; SONCC coho salmon and CCC coho salmon do not occupy many of the streams where they occurred historically. Although SONCC coho salmon within the action area are relatively more abundant and better distributed than CCC coho salmon, both the presence-absence and trend data available suggest that many SONCC coho salmon populations in the larger basins (*e.g.*, Eel and Klamath) continue to decline. Available information suggests that CCC coho salmon abundance is very low, the ESU is not able to produce enough offspring to maintain itself (population growth rates are negative), and populations have experienced range constriction, fragmentation, and a loss in genetic diversity. Many subpopulations that may have acted to support the species' overall numbers and geographic distribution have likely been extirpated (*i.e.* San Francisco Bay Area, Napa HUCs). The poor condition of their habitat in many areas and the compromised genetic integrity of some stocks pose a serious risk to the survival and recovery of SONCC coho salmon and CCC coho salmon. Based on the above information, recent status reviews have concluded that SONCC coho salmon are likely to become endangered in the foreseeable future, and CCC coho salmon are presently in danger of extinction, therefore the likelihood of both survival and recovery are reduced compared to an ESU at low risk of extinction.

The adverse effects to CCC coho salmon and SONCC coho salmon within the action area are not expected to affect the overall survival and recovery of the ESUs. Adverse effects to individuals and habitat include actions that are expected to cause temporary and permanent habitat degradation or removal; increased sedimentation and turbidity; dewatering, capture, and relocation; and hydraulic effects (Section 2.5). The implementation of avoidance and minimization measures, however, would significantly reduce direct and indirect adverse effects of those activities (Section 1.3.9). These actions are expected to result in adverse effects to a small number of individuals, and small portions of localized habitat, leading to migration delays, injury or death, and harm. These adverse effects are expected to affect a very small proportion of the ESUs.

2.7.2.2 Steelhead (Oncorhynchus mykiss)

Although NC steelhead, CCC steelhead, CV steelhead, SCC steelhead, and SCCC steelhead have experienced significant declines in abundance, and long-term population trends suggest a negative growth rate, they have maintained a better distribution overall when compared to coho salmon ESUs. This suggests that, while there are significant threats to the population, they possess a resilience (based in part, on a more flexible life history) that likely slows their decline. However, the poor condition of their habitat in many areas and the compromised genetic integrity of some stocks pose a risk to the survival and recovery of NC steelhead, CCC steelhead, CV steelhead SCC steelhead, and S-CCC steelhead.

Recent updated status reports indicate that chief causes for the numerical decline of steelhead in southern California include urbanization, water withdrawals, channelization of creeks, human-made barriers to migration, and the introduction of exotic fishes and riparian plants (Good et al. 2005, Williams et al. 2011c; NMFS 2016b). The factors most generally attributed with causing NC DPS steelhead decline include: land use activities associated with logging, road construction, urban development, gravel mining, agriculture, ranching, and recreation. These activities all result in the loss, degradation, simplification, and fragmentation of available habitat for the DPS. Central Valley steelhead face many similar threats to SCCC steelhead, SCC steelhead, CCC steelhead and NC steelhead including loss of freshwater spawning and rearing habitat, loss of estuarine habitat, and degraded watershed processes. This program includes actions that could worsen the greatest threats facing these DPSs, such as construction actions that require riparian habitat removal and altering stream bank or river channel morphology (and further described in the analysis of the effects of the action Section 2.5). The adverse effects of the proposed activities are expected to affect small portions or localized habitat and individuals, leading to migration delays, injury or death, and harm. The implementation of avoidance and minimization measures, however, would significantly reduce direct and indirect adverse effects of those activities (Section 1.3.9).

2.7.2.3 Chinook salmon (Oncorhynchus tshawytscha)

The most recent status review for CV spring-run Chinook, CC Chinook, and SR winter-run Chinook found continued evidence of low population sizes relative to historical abundance. The status review for SR winter-run Chinook salmon ESU demonstrated that the ESU has further declined, and that continued loss of historical habitat and the degradation of remaining habitat continue to be major threats to the SR winter-run Chinook salmon ESU (NMFS 2016e). Sacramento River winter-run Chinook are at high risk of extinction.

In the 2016 status review, NMFS found, with a few exceptions, that CV spring-run Chinook salmon populations have increased through 2014 returns since the last status review (2011), which moved the Mill and Deer creek populations from the high extinction risk category to moderate, and Butte Creek remaining in the low risk of extinction category. Additionally, the Battle Creek and Clear Creek populations continued to show stable or increasing numbers in that period, putting them at moderate risk of extinction based on abundance.

For CC Chinook salmon, the status review demonstrated mixed abundance trends within some larger watersheds of northern California which may suggest some populations are persisting;

however, the low abundance, low productivity, and potential extirpations of populations in the southern part of the CC Chinook salmon ESU are of concern. The reduced abundance contributes significantly to the long-term risk of extinction, and is likely to contribute to the short-term risk of extinction in the foreseeable future. The ESU's geographic distribution has been moderately reduced, but especially for southern populations in general and spring-run Chinook salmon populations in particular.

Based on the above information, recent status reviews and available information indicate CC Chinook salmon and CV spring-run Chinook salmon are likely to become endangered in the foreseeable future. The extinction risk for the SR winter-run Chinook salmon ESU has increased from moderate risk to high risk of extinction since 2005. Therefore, the likelihood of both survival and recovery are reduced compared to an ESU at low risk of extinction.

The adverse effects from program activities to CC Chinook salmon, SR winter-run Chinook salmon, and CV spring-run Chinook salmon within the action area are not expected to affect the overall survival and recovery of the ESUs. Adverse effects to individuals and habitat include actions that are expected to cause temporary and permanent habitat degradation or removal; increased sedimentation and turbidity; dewatering, capture, and relocation; and hydraulic effects (Section 2.5). The implementation of avoidance and minimization measures, however, would significantly reduce direct and indirect adverse effects of those activities (Section 1.3.9). These actions are expected to result in adverse effects to individuals, and small portions of localized habitat, leading to migration delays, injury or death, and harm. These adverse effects are expected to affect a very small proportion of the ESUs.

2.7.2.4 North American green sturgeon (Acipenser medirostris)

The viability of sDPS green sturgeon is constrained by factors such as a small population size, lack of multiple populations, and concentration of spawning sites into just a few locations. The risk of extinction is believed to be moderate because, although threats due to habitat alteration are thought to be high and indirect, evidence suggests a decline in abundance. There is much uncertainty regarding the scope of threats and the viability of population abundance indices.

Based on the best available science, there is likely one population of sDPS green sturgeon within the ESU. This increases the risk of extinction to the ESU, and makes it more vulnerable to any action resulting in adverse effects. Green sturgeon are particularly susceptible to changes in benthic habitat, as they rely on such habitat to forage for food. Those proposed actions expected to adversely affect individual green sturgeon include those with temporary benthic habitat disturbance resulting in decreased feeding and growth. Implementation of avoidance and minization measures (Section 1.3.9), however, are expected to temporarily effect only localized areas anda very small proportion of the sDPS.

2.7.2.5 Eulachon (Thaleichthys pacificus)

Eulachon use the estuaries and the first few miles of river mainstems for spawning, incubation, growth, maturation, and migration. Eulachon population abundance has declined significantly since the early 1990s. The 2010 status review of sDPS eulachon determined that the species was at moderate risk of extinction throughout all of its range. Since then, monitoring has demonstrated that sDPS Eulachon populations have generally improved. However, recent poor ocean conditions and the likelihood that these conditions will persist into the near future suggest that population declines may be widespread in the upcoming return years.

Although NMFS considers variation in ocean productivity to be the most important natural phenomenon affecting the productivity of these species, NMFS identified many other factors associated with the freshwater phase of their life cycle that are also limiting the recovery of these species. These factors include, but are not limited to, elevated water temperatures; excessive sediment; reduced access to spawning and rearing areas; and reductions in habitat.

Adverse effects to individuals and habitat include actions that are expected to cause temporary and permanent habitat degradation or removal; increased sedimentation and turbidity; dewatering, capture, and relocation; and hydraulic effects (Section 2.5). These actions are expected to result in adverse effects to individuals, and small portions of localized habitat, leading to migration delays, injury or death, and harm. The implementation of avoidance and minimization measures, however, would significantly reduce direct and indirect adverse effects of those activities (Section 1.3.9). These adverse effects are expected to affect a very small proportion of the DPS.

2.7.2.6 Black abalone (Haliotis cracherodii)

Black abalone populations throughout California face high risk in each of four demographic risk criteria: abundance, growth rate and productivity, spatial structure and connectivity, and diversity (VanBlaricom *et al*. 2009). Threats posed by disease (i.e., withering syndrome), suboptimal water temperatures; and illegal take exacerbate the risk of extinction faced by the species. Threats to black abalone critical habitat include coastal development or in-water construction; activities that can increase sedimentation; oil or chemical spills and response activities; and vessel grounding and response activities.

This proposed project involves activities that are expected to adversely affect black abalone individuals and critical habitat by increasing sedimentation, temporarily or permanently degrading habitat resulting in less habitat for larval recruitment and settlement. Implementation of avoidance and minization measures (Section 1.3.9), however, are expected to temporarily effect only localized areas and a very small proportion of the sDPS.

Recovering the species will involve protecting the remaining healthy populations to the north that have not yet been affected by withering-foot syndrome, and increasing the abundance and density of populations that have already been affected by the disease.

2.7.3 ESU/DPS Survival and Recovery/Critical Habitat Value

Because NMFS can determine that program wide application of the project avoidance and minimizations measures acutely minimize the effects of each project carried out under the programmatic, we find that application of the program is likely to adversely affect a very small number of individual fish per year over the term of the program. Becauses of the few fish affected, the viable salmonid population criteria of abundance, productivity, distribution, or genetic diversity of any salmon or steelhead population to which those individual fish belong will not be negatively affected. This conclusion is also true for eulachon, green sturgeon, and black abalone. The adverse effects of the program on individual fish and/or abalone will be too few to affect the abundance, productivity, distribution, or diversity of eulachon, green sturgeon, or black abalone.

At the ESU or species scale, the status of individual populations determines the ability of the species to sustain itself or persist well into the future, thus impacts to the populations are important to the survival and recovery of the species. Because the VSP characteristics at the population scale will not be affected, the likelihood of survival and recovery of the listed species will not be appreciably reduced by the proposed action.

Based on the above analysis for critical habitats, when considering the status of the species, the effects of the proposed action, when added to the effects of the environmental baseline, and anticipated cumulative effects and climate change, critical habitat will remain functional or retain the current ability for the PBFs to become functionally established, to serve the interested conservation role for ESA listed salmonids, steelhead, eulachon, green sturgeon, and black abalone. Thus, the proposed action is not likely to result in appreciable reductions in the value of designated critical habitat for the conservation of the species.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of North American green sturgeon, Southern Oregon/Northern California Coast Coho salmon, Central California Coast Coho salmon, Southern California Steelhead, South-Central California Coast Steelhead, Central Valley Steelhead, Central California Coast Steelhead, Northern California steelhead, California Coastal Chinook, Central Valley Spring-run Chinook, Sacramento River Winter-run Chinook, Southern DPS Eulachon, and black abalone.

After reviewing and analyzing the current status of the critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to destroy or adversely modify the above species' designated critical habitat.

2.9 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a 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 (16 USC 1532). "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1 Amount or Extent of Take

Work necessary to construct and maintain the projects authorized under the FEMA's Mitigation and Disaster Preparedness Program will take place throughout the Action Area beside and within aquatic habitats that are reasonably certain to be occupied by individuals, or within critical habitat, of the 13 ESA-listed species considered in this consultation. NMFS anticipates that juvenile and adults will be stressed, captured, injured, or killed as a result of Program implementation due to their presence within the Action Area and Program activities.

Juvenile fish will be captured during work area isolation necessary to minimize construction-related disturbance of streambank and channel areas caused by stormwater outfalls, roads, culverts, bridges, and utility lines. In-stream disturbance that cannot be avoided by work area isolation will lead to short-term increases in suspended sediment, temperature, dissolved oxygen demand, or other contaminants, and an overall decrease in habitat function that harms adult and juvenile fish by denying them normal use of the action area for reproduction, rearing, feeding, or migration. Exclusion from preferred habitat areas causes increased energy use and an increased likelihood of predation, competition and disease that is reasonably certain to result in injury or death of some individual fish.

Similarly, adult and juvenile fish are reasonably certain to be harmed by construction-related disturbance of upland, riparian and in-stream areas for actions related to caused by (1) installation, repair, or replacement of facilities, roads, culverts, and bridges; (2) non-emergency debris removal; and (3) wildfire risk reduction activities and related in-stream work. The effects of those actions will include additional short-term reductions in water quality, as described above, and will also harm adult and juvenile fish as described above.

This take will typically occur within an area that includes the streamside, channel, estuary, or marine footprint of each project, and downstream for pathways that are caused by diminished water quality. Projects that require two or more years of work to complete will cause adverse effects that last proportionally longer, and effects related to runoff from the construction site may be exacerbated by winter precipitation. These adverse effects may continue intermittently for weeks, months, or years until riparian vegetation and floodplain vegetation are restored and a new topographic equilibrium is reached. Incidental take is expected to occur in the forms of harm, harass, capture, injury, or death. Incidental take that meets the terms and conditions of this incidental take statement will be exempt from the taking prohibition.

In summary, the best available indicators for amount and extent of take for these proposed actions are as follows. For actions that involve:

- ***Construction-related disturbance of streambank and channel*** – The extent of take indicator is 45,050 linear stream feet per year, as proportioned by NMFS Field Office Jurisdiction (Table 4).

- ***Construction-related disturbance of estuarine/marine waters*** – The extent of take indicator is 7.96 acres of estuarine/marine areas, as proportioned by NMFS Field Office Jurisdiction (Table 4).

- ***Pile Driving –*** The extent of take indicator for for piling projects is 5 projects *and* 150 dB RMS behavioral threshold exceeded no more than 13,000 ft from pile, 187db/183dB cumulative SEL threshold exceeded no more than 1,150 ft from pile (Table 4).

- ***Capture of juvenile fish during in-water work area isolation –*** The amount of take is 5,400 juvenile salmonids, 10 juvenile green sturgeon, 10 eulachon, and 2 black abalone handled per year, as proportioned by species (Table 5).

2.9.1.1 Harm from Disturbance to Habitat

In some cases, it is impossible to precisely quantify and track the amount or number of individuals that are expected to be incidentally taken (injure, harm, kill, etc.) per species as a result of the proposed action's components due to the variability and uncertainty associated with the response of listed species to the effects of the proposed action, the varying population size of each species, annual variations in the timing of spawning and migration, individual habitat use within the action area, and uncertainty of exact timing and location of each project. However, it is possible to estimate the extent of incidental take by designating as ecological surrogates, those elements of the project that are expected to result in incidental take, that are more predictable and/or measurable, with the ability to monitor those surrogates to determine the extent of incidental take that is occurring.

The most appropriate threshold for incidental take is an ecological surrogate of temporary and permanent habitat disturbance during FEMA's Mitigation and Disaster Preparedness Program activities. This variable is proportional to the amount of harm that the proposed action is likely to cause through short-term degradation of water quality and physical habitat. Program activities are expected to increase sediment, turbidity, temperature, contaminants, and noise, and reduce dissolved oxygen and streambank vegetation in amounts that correlate to the area of stream reach modified. Habitat disturbance is also proportional to the amount of harm that the proposed action is likely to cause through long-term impacts resulting from destruction or removal of riparian habitat; permanent hydrologic effects to the streambed, bank and shoreline; permanent loss or alteration of shallow water habitat; and permanent loss or alteration of mid-channel habitat. Disruption of habitat utilization is expected to result in fish behavioral modifications leading to harm as described below:

1. Harm to listed species from exclusion from preferred habitat areas. This disruption will affect the behavior of listed species, including migration delay and displacement, which is reasonably certain to result in increased energy use and an increased likelihood of predation, competition and disease resulting in reduced growth.

2. Harm to listed fish from underwater noise activities where underwater noise may harass or cause temporary behavioral modification, which is reasonably certain to result in reduced fitness, survival, and growth.

3. Harm to listed species from turbidity increases resulting from habitat-related disturbances during construction activities. Increases in turbidity are reasonably certain to result in harm to the species through modification or degradation of PBFs for rearing and migration that will result in physiological impacts, temporary displacement of individuals, reduced feeding, and increased predation.

Based on historical ESA consultations with FEMA (*i.e.*, the past 10 years), the extent of the 2017 flood disasters in California, and assuming an increase in the frequency and magnitude of disasters when compared to historical period, NMFS adopts FEMA's assumption that approximately 106 actions per year may be funded or carried out under this BO. Based on the Program-level limits established in the FEMA's Proposed Suitability Criteria (Section 1.3.7 and 1.3.8), NMFS estimates that each action may modify up to 500 linear feet of streambed or streambank habitat or up to 0.5 acre of esuarine or marine water habitat. In order to accurately account for project impacts, disturbance from a project would only be applied to either the program level disturbance in linear feet or acres. Projects involving the bed and banks of streams and rivers will use the linear feet of disturbance as the method of reporting, while projects involving estuarine/marine disturbance will be reported as area (acres) of disturbance. Therefore, the yearly extent of take for habitat disturbance of streambank and streambed areas is 45,050 linear feet, and the yearly extent of take for habitat disturbance of estuarine or marine areas is 8.56 acres, both partitioned between field offices (Table 4). The Program-level limits have been projected by multiplying the estimated take by the approximated number of covered projects in the jurisdictional area of each of the NMFS field offices in California. The NMFS jurisdictions were used instead of the range of individual species because, in many areas of habitat, listed species may co-occur. Based on historical data, FEMA has funded more projects that may result in take of listed species in northern and central coastal California than in the southern or the interior part of the State. NMFS assumes that the proposed actions will continue to be distributed among the NMFS field office in the same proportion as in the past and has assigned this take to individual NMFS field offices whenever possible (Table 4).

Table 4. Extent of take indicators for actions authorized or carried out under the FEMA Programmatic, by NMFS Field Office Jurisdiction per year.

NMFS Field Office Jurisdiction	Anticipated Number of Projects Covered*	Estuarine/Marine Waters Extent of Take in acres**	Streambed/Streambank Extent of Take in linear feet***
Long Beach Field Office	8	0.6	3,400
Santa Rosa Field Office	45	3.38	19,125
Arcata Field Office	30	2.26	12,750
Sacramento Field Office	23	1.72	9,775
Pile Driving Projects, All Offices	5	Not to exceed 5 projects and 150 dB RMS behavioral threshold exceeded no more than 13,000 ft from pile, 187db/183dB cumulative SEL threshold exceeded no more than 1,150 ft from pile. ****	Not to exceed 5 projects and 150 dB RMS behavioral threshold exceeded no more than 13,000 ft from pile, 187db/183dB cumulative SEL threshold exceeded no more than 1,150 ft from pile. ****

* Provided to inform the calculation of take estimates, the number of projects covered is not part of the yearly take limit.
** Estuarine/marine waters include all areas below mean higher high water. As based on the project footprint, which includes all temporary and permanent effects to suitable habitat from ground-disturbance and/or vegetation removal in the stream bed and/or bank or shoreline. Individual projects will draw from either the program-level limit of estuarine/marine waters or streambed/streambank, depending on their location.
*** As based on the project footprint, which includes all temporary and permanent effects to suitable habitat from ground-disturbance and/or vegetation removal in the stream bed and/or bank or shoreline. Individual projects will draw from either the program-level limit of estuarine/marine waters or streambed/streambank, depending on their location.
**** Assumes a 24-inch steel pile, 500 strikes per pile, 4 piles per day. Also assumes 5dB attenuation from bubble curtain and a transmission loss of 15. Using sound levels for 24 inch steel pipe pile, ~15m depth in Table I.2-1. of Caltrans 2015.

These take indicators function as effective reinitiation triggers because they are calculated and monitored on an annual basis, and thus will serve as a check on the proposed action on a regular basis. Incidental take will be exceeded if the amount of habitat disturbance described in each of the areas in the table above is exceeded, which would indicate the surrogate is exceeded.

2.9.1.2 Capture of Listed species

For proposed project components in which take through fish and abalone capture and relocation would occur, the magnitude of take may be estimated using the number of individuals affected. NMFS adopts FEMA's proposal to use program-level take limit estimates by number of individuals. Because of the nature of this programmatic consultation, FEMA does not have data on the future types of projects anticipated, their location, nor their extent. Therefore, FEMA has compiled data from historical FEMA ESA consultations and projected historical estimates into the future as a reasonable prediction for program-level take. For species that FEMA has not consulted on in the recent past, consultations completed by other action agencies were used to develop take estimates. Based on historical data, FEMA has funded more projects that may result in take of an ESA-listed species in northern and central coastal California than in southern or the interior part of the state.

For listed species, the amount oftake by injury or mortality is five percent of the take by harassment limit, which is a reasonable value for injury incidental to fish capture and relocation efforts (McMichael *et al.* 1998). Incidental take will be exceeded if the amount of take for any individual species is exceeded (Table 5). FEMA would request reinitiation of ESA consultation if this occurs.

Table 5. Amount of Take per year by species for projects that may involve fish or abalone capture and relocation

Covered Species (DPS or ESU) (Color Coded by Species)	Yearly Program-Level Limits - Take by Harassment	Yearly Program-Level Limits - Take by Injury or Mortality
Steelhead, Southern California DPS	180	9*
Steelhead, South-Central California Coast DPS	540	27*
Black Abalone	2	0
Steelhead Central California Coast DPS	1,080	54*
Coho Salmon, Central California Coast ESU	360	18*
Chinook Salmon, California Coastal ESU	720	36*
Coho Salmon, Southern Oregon-Northern California ESU	360	18*
Steelhead, Northern California DPS	540	27*
Eulachon, Southern DPS	10	0
Chinook Salmon, Sacramento Winter-run ESU	180	9*
Chinook Salmon, Central Valley Spring-run ESU	720	36*
Steelhead, Central Valley DPS	720	36*
Green Sturgeon, Southern DPS	10	0*

DPS = Distinct Population Segment / ESU = Evolutionary Significant Unit

* Take by mortality is limited to juvenile fish for these species and does not apply to adult fish. With implementation of the avoidance and minimization measures, no lethal take of adults is anticipated.

2.9.2 Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.9.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

The following measures are necessary and appropriate to minimize the impact of incidental take of listed species from the proposed action.

1. FEMA shall minimize incidental take resulting from funded projects by ensuring that all such projects use the AMM's described in the proposed action and analyzed in this opinion, as appropriate.

2. FEMA shall ensure completion of a comprehensive monitoring and reporting program regarding all projects funded by FEMA by preparing and providing NMFS with plan(s) and report(s) describing how impacts of the incidental take of listed species in the action area would be monitored and documented.

3. Each subapplicant receiving FEMA funding shall report and monitor for take pathways within their authority (e.g., revegetation monitoring, underwater noise monitoring, fish rescue and relocation reporting).

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and FEMA, or any other party affected by these terms and conditions, must comply with them to implement the reasonable and prudent measures (50 CFR 402.14). FEMA has a continuing duty to track the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR 402.14). If the following terms and conditions are not complied with, the protective coverage of section 7(o)(2) will likely lapse.

1. To implement reasonable and prudent measure #1, FEMA shall ensure that:

    a. For each action funded or carried out under this opinion, avoidance and minimization measures 1 through 33, as appropriate, shall be added as a subapplicant condition.

    b. FEMA shall provide copies of the BO and any NMFS additional project specific requirements to the subapplicants.

2. To implement reasonable and prudent measure #2, the FEMA shall:

    a. Prepare an annual report to NMFS, by March 15, containing a summary of the numbers and types of projects implemented under the BO, which shall include:

        i. A tabular summary of those projects.

        ii. An accounting of take based on number of individuals and/or disturbance to habitat as a surrogate (as appropriate) and a tally of the total from all prior years.

        iii. The project action details, project locations, subapplicant names, and the effects of the action on federally listed species and critical habitat in the action area.

b. For projects that meet the ESA suitability criteria as "NLAA" or "LAA" projects and/or the MSA suitability criteria of "may adversely affect EFH":

   i. FEMA shall ensure that the necessary materials are provided with the ESA/MSA Review Form (Appendix A). The ESA/MSA Review Form shall be submitted to NMFS at least 30-days prior to the start of project construction.

   ii. For those projects that may result in take of a listed species and would be covered under this opinion and the associated ITS, FEMA shall include a take assessment in the ESA/MSA Review Form as described in Section 1.3.4.

c. The FEMA Region IX shall attend an annual coordination meeting with NMFS by May 15 each year to discuss the annual monitoring report and any adaptive management measures needed to minimize impacts.

3. To implement reasonable and prudent measure #3, FEMA shall:

   a. Require the subapplicant completes all project monitoring and reporting (e.g., revegetation monitoring, underwater noise monitoring, fish rescue and relocation reporting).

   b. Require the subapplicant monitors the project area to ensure vegetation plantings meet the 80 percent retention requirement within five years of planting.

   c. Require the subapplicant to provide a monitoring report that will include an assessment of project activity. This report shall include how listed species and habitat will be monitored and any annual maintenance needed for specific sites.

2.10 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

In coordination with the USFWS and NMFS, FEMA is currently developing a Conservation Program in compliance with ESA Section 7(a)(1) for its disaster, mitigation, and preparedness programs in California, Nevada, and Arizona. This Conservation Program would include the following four elements: (1) develop procedures for implementing its disaster, mitigation, and preparedness programs within the context of listed resource conservation; (2) educate subapplicants on species conservation; (3) educate and inform subapplicants to incorporate project design and project planning features for species conservation; and (4) incorporate an ecosystem-services approach into its decision-making process.

Although the specific framework for the Conservation Program is still under development, FEMA has outlined the framework for the Conservation Program, which is included below.

2.10.1 Procedures for Implementing FEMA Programs within the Context of Listed Resource Conservation

FEMA Region IX would continue to develop and implement collaborative efforts with NMFS at the programmatic level. Although FEMA has already initiated these types of collaborative efforts over the past decade, FEMA would continue these efforts with feedback from and through regular interagency communication with NMFS. The most recent example of this effort is the signed 2015 MOU among FEMA, USFWS, NMFS, and USACE.

2.10.2 Education of Subapplicants on Species Conservation

FEMA Region IX would continue to develop an outreach program to educate the subapplicants on conservation efforts for federally listed/proposed species and their habitats. As part of this outreach program, FEMA Region IX is preparing an educational pamphlet that would be distributed to all potential subapplicants. The pamphlet would include information on the following: the general environmental regulatory requirements, federally listed/proposed species and candidate species, critical habitat, EFH, recovery plans for species, access to information in IPaC,[13] the steps and process to comply with the ESA requirements, roles and responsibilities, and communication protocols with Federal and State agencies. The pamphlet would encourage subapplicants to proactively implement conservation efforts to benefit candidate species before those species are listed under the ESA.

As part of this outreach program, FEMA Region IX would also educate the subapplicants on conservation strategies included in recovery plans for federally listed species and encourage them to collect species information prior to, during, and after project implementation, when feasible. This would allow the implementation of strategic habitat conservation already developed for specific species in the recovery plans. The pamphlet would also advise the subapplicants to submit the species information and fish passage information they have collected to:

- CDFW’s California Natural Diversity Database – data viewing available through CDFW's Bios Viewer at https://map.dfg.ca.gov/bios/; and
- Calfish Passage Assessment Database – data viewing available throgh CDFW's Bios Viewer at https://map.dfg.ca.gov/bios/.

FEMA would encourage the subapplicants to carry out or participate in voluntary activities that promote the recovery of federally listed, proposed, and candidate species. FEMA would coordinate such activities with NMFS before implementation, such as described in this BO.

[13] Information for Planning and Consultation or iPac is a project-planning tool that streamlines the USFWS environmental review process. Available online at https://ecos.fws.gov/ipac/.

2.10.3 Conservation Efforts at Project Design and Project Planning Levels by Subapplicants

FEMA Region IX would educate and inform the subapplicants to incorporate project design and project planning features to avoid, reduce, and prevent potential adverse effects from their projects on federally listed/proposed species, their critical habitats, and EFH to the maximum extent feasible. If subapplicant's engineers design and implement proposed projects in a manner that avoids, reduces, or prevents potential adverse effects on federally listed/proposed species, their critical habitats, and EFH, then federally listed/proposed species and EFH may not be affected at all or adverse effects may be minimized to a level that may result in a simpler and faster ESA consultation for the proposed project. Steps to avoid, reduce, or prevent potential adverse effects would need to be incorporated into project planning and design by the subapplicant prior to applying for funds under a FEMA Program. For example, subapplicants may incorporate the agency guidelines on bioengineering and living shoreline techniques for erosion control in the early stages of their project design.

These early efforts ensure the incorporation of conservation efforts at the project design and planning levels, as opposed to having to incorporate avoidance and minimization measures after the project has already been designed. The subapplicant would incorporate these steps to avoid, reduce, or prevent potential adverse effects in the early stages of design for a proposed project, instead of being required to implement them during or after an ESA consultation between FEMA and NMFS. For these reasons, these efforts would be under ESA Section 7(a)(1) (i.e., a Federal agency would implement a conservation program), as opposed to ESA Section (7(a)(2) (i.e., a Federal agency consults with USFWS and/or NMFS on a proposed project).

2.10.4 Incorporating Ecosystem Services into FEMA's Decision-making Process

The term "ecosystem services" has been coined to express the value of natural systems to human well-being. Some examples of the benefits that ecosystem services may provide include the purification of air and water, detoxification and decomposition of wastes, regulation of climate, regeneration of soil fertility, and production and maintenance of biodiversity, from which key ingredients of our agricultural, pharmaceutical, and industrial enterprises are derived. Maintaining those ecosystem services in turn provides indirect benefits to federally listed/proposed species by protecting or maintaining habitat quality for those species, maintaining migration corridors, and providing habitat connectivity, among others.

FEMA would incorporate ecosystem services into its decision-making process. Some examples include:

- Using an interactive science-policy process;
- Implementing adaptive management;
- Training FEMA Region IX grants participants (i.e., staff from FEMA staff, Cal OES, subapplicants, and FEMA contractors) in the approaches and tools to incorporate ecosystem protection;

- Implementing a qualitative value of the benefits of ecosystem services into the FEMA grants selection process;
- Implementing a valuation of and incentives for conservation measures taken by the subapplicants;
- Assisting FEMA incorporate ecosystem services into its mission, strategies, and work plans; and
- Evaluating costs and benefits of ecosystem services in FEMA-funded projects.

2.11 Reinitiation of Consultation

This concludes formal consultation for FEMA's funding of grant programs related to disaster, mitigation, and preparedness in California.

As 50 CFR 402.16 states, 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 taking specified in the ITS 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 on the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the FEMA and descriptions of EFH for Pacific Coast groundfish (PFMC 2005), coastal pelagic species (PFMC 1998), Pacific Coast salmon (PFMC 1999), and highly migratory species (PFMC 2007) contained in the fishery management plans developed by the Pacific Fishery Management Council (PFMC) and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

Within the Action Area, EFH designations have been made for all estuarine and coastal waters of California as well as many inland watersheds that support salmon. The following FMPs designate EFH covered under this BO (Figures 4A and 4B):

- Pacific Coast Salmon FMP
- Coastal Pelagic Species FMP
- Pacific Coast Groundfish FMP
- Highly Migratory Species FMP

3.2 Adverse Effects on Essential Fish Habitat

Based on information provided by the action agency and the analysis of effects presented in the ESA portion of this document, NMFS concludes that the proposed action will have adverse effects on EFH designated for Pacific Coast salmon in freshwater where projects will occur. Pacific salmon, groundfish and coastal pelagic species will also be adversely affected in estuaries, including estuarine areas designated as habitat areas of particular concern (HAPCs) in the San Francisco Bay, Suisan March, and at other river mouths, bays, estuaries, and coastal waters where projects will occur.

1. **Water Quality (spawning, rearing, and migration).** The project has the potential to increase temperature through vegetation removal, introduce chemical contaminants through construction activities, and increase sediment, stormwater runoff, and dissolved

oxygen demand from vegetation disturbance and construction. AMMs such as erosion control measures utilizing silt fences, vegetated ditches, and work in the dry and short duration of activities will minimize effects to water quality. Because of the AMMs that FEMA will implement, the low probability of a large spill, and the low intensity and short duration of any resulting effect from small drips/leaks, effects to water quality will be very minor. Long-term beneficial effects includes the potential to improve riparian function, floodplain connectivity, and improved stormwater treatment.

2. **Water Quantity (rearing and migration).** The project has the potential to reduce water quantity due to short-term construction needs, reduced riparian permeability, and increased riparian runoff. Long-term beneficial effects includes the potential to improve water quantity based on improved riparian function and floodplain connectivity.

3. **Safe Passage (migration).** Fish passage will be impaired in the short-term due to decreased water quality and in-water work isolation, and improved over the long-term due to improved stream-road crossing structures, water quantity and quality, habitat diversity and complexity, forage, and natural cover.

4. **Substrate (migration & spawning).** Substrate will have a short-term reduction in quality due to increased compaction and sedimentation, and a long-term increase in quality due to gravel placement, and increased sediment storage from boulders and large wood.

5. **Forage (rearing and migration).** Forage will have a short-term decrease in availability due to riparian and channel disturbance and a long-term increase in availability due to improved habitat diversity and complexity, and improved riparian function and floodplain connectivity.

6. **Cover/shelter (rearing and migration).** Natural cover will have short-term decrease due to riparian and channel disturbance, and a long-term increase due to improved habitat diversity and complexity, improved riparian function and floodplain connectivity.

7. **Floodplain Connectivity (rearing and migration).** The project will have a short-term decrease due to increased compaction and riparian disturbance during construction, and a long-term improvement due to streambank stabilization methods that incorporate riparian vegetation.

8. **Estuarine and nearshore EFH quality** (rearing and migration) will be temporarily reduced due to short-term releases of suspended sediment, benthic disturbance, and damage to submerged aquatic vegetation. Affected habitats includes:

   - Water column
   - Estuary (HAPC)

   Long-term reduction in nearshore habitat through the disturbance associated with in-water and over-water structures, boat use, and removal of riparian vegetation resulting in the reduction of allochthonous input to the nearshore.

9. Shading of submerged aquatic vegetation and resulting reduction in submerged aquatic vegetation density and abundance related primarily from over-water structures.

3.3 Essential Fish Habitat Conservation Recommendations

Because the properties of EFH that are necessary for the spawning, breeding, feeding or growth to maturity of managed species in the action area are the same or similar to the biological requirements of ESA-listed species as analyzed above, NMFS has provided two conservation recommendations.

The following conservation recommendations are necessary to avoid, mitigate, or offset the impact of the proposed action on EFH:

1. Ensure completion of a monitoring and reporting program as described in term and condition numbers 1 and 2 in the accompanying opinion to verify the action is meeting its objective of minimizing habitat modification from funded activities.

2. As appropriate to each action funded under this opinion, include the avoidance and minimization measures as enforceable grantee conditions.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, FEMA must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

The FEMA must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this document is helpful, serviceable, and beneficial to the intended users. The intended users is the Federal action agency, FEMA.

The opinion in this document concludes that the proposed action for the FEMA Endangered Species Programmatic will not jeopardize the affected listed species or result in the adverse modification of their critical habitat. Therefore, FEMA can fund this action in accordance with its authority under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended and Emergency Management-related Provisions of the Homeland Security Act, as amended FEMA 692, August 2016.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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6. LIST OF APPENDICES

These Appendices follow as separate documents or files:

Appendix A: ESA/MSA Review Form

Appendix B: NMFS Fish Passage Guidelines (The most current fish passage guidelines are subject to change)

Appendix C: FEMA In-Water Work Windows

Appendix D: Fish Screening Criteria for Anadromous Salmonids (NMFS 1997)

Appendix E: Bioengineering Techniques

Appendix B

Conservation Measures for Not Likely to Adversely Affect Species

Appendix B

The U.S. Fish and Wildlife Service (Service) consulted on the Federal Emergency Management Agency's (FEMA) Disaster, Mitigation, and Preparedness Programs in California within the jurisdiction of the Ventura Fish and Wildlife Office (VFWO) and its effects on federally listed species and critical habitat, in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.). FEMA provided these conservation measures as part of the programmatic biological assessment[1] (PBA) for the programmatic consultation. Implementation of the following conservation measures is required in order for any specific project activity to be considered under the programmatic concurrence provided in the accompanying document. For any actions where FEMA or its Subapplicants are unable to implement the following measures, FEMA must submit the project for separate section 7 consultation as the effects to listed species or their designated critical habitat outside the scope of these conservation measures have not been assessed or analyzed.

Conservation Measures for California Least Tern (*Sterna antillarum browni*) and Light-Footed Ridgway's Rail (*Rallus longirostris levipes*)

1. To avoid the nesting season of the California least tern, project activity in occupied habitat will be allowed from September 30 - March 31. Occupied habitat for this species is well documented online. If project activities occur during the nesting season, they will occur at least 800 feet away from California least tern occupied habitat, and noise within occupied habitat will be monitored to ensure that it does not exceed 60 decibels hourly Leq.
2. A habitat assessment will be conducted by a biologist to determine whether suitable habitat (including foraging, nesting, and dispersal) for the light-footed Ridway's rail 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 light-footed Ridway's rail, the VFWO will be contacted regarding the need for additional surveys and those surveys will be conducted, as appropriate. Otherwise, if the VFWO agrees, the species will be assumed to be present in areas with suitable habitat.
3. To avoid the nesting season of the light-footed Ridway's rail, project activity in occupied habitat will be allowed from September 16 - March 14. If project activities occur during the nesting season, they will occur at least 500 feet away from light-footed Ridgway's rail occupied habitat, and noise within occupied habitat will be monitored to ensure that it does not exceed 60 decibels hourly Leq.
4. A Service-approved biologist will monitor all construction activities within occupied habitat to ensure that no take of the species or destruction of occupied habitat occurs. The Service-approved biologist will have stop work authority if adverse effects of nesting California least terns or light-footed Ridgway's rails are observed.
5. Non-breeding season project activity in occupied habitat will be limited to the use of handheld tools, including handheld motorized implements such as chain saws and power

[1] The measures in the PBA are part of a state-wide consultation. The measures were created by different Service offices in collaboration with FEMA. For consistency with the state-wide programmatic, we have kept the numbering system reflective of the PBA even though it is not consistent within this appendix.

augers. Tools will be washed prior to use in these habitats to reduce the potential for spread of non-native and invasive plant species and their seeds. No heavy equipment will be allowed within suitable nesting habitats.

6. No soil stabilization materials or off-site materials (e.g., decomposed granite, soil, rocks, etc.) will be added to the surface within occupied habitat. No excavation or grading would be allowed within occupied habitat either.
7. If handheld motorized tools are used, operators will employ best management practices to avoid and minimize soil and water contamination from fuel and lubricants. Measures include:
   a. use spill-resistant fuel and lubricant containers;
   b. use a portable containment pad for re-fueling in the field;
   c. immediately report petroleum spills to the landowner, or land management agency, and notify appropriate local authorities for advice and action on containment and cleanup of spills; and
   d. clearly mark the location and/or boundaries of the spill site to enable rapid remedial action.
8. When necessary to minimize the area affected by the project, work site boundaries will be marked with flagging or other visible materials, which will be removed at the conclusion of the project.
9. Workers will avoid temporary or permanent placement of structures (e.g., posts, railings, tall equipment, or fence lines) that could provide elevated perches for predatory birds near or within occupied habitat.
10. Access to work sites in occupied habitat will be by foot travel only. Motorized vehicles, including all-terrain vehicles, will not be used in occupied habitat.
11. At the conclusion of the project, areas temporarily affected by project activity will be restored to their pre-project condition (e.g. footpaths will be raked to their original ground contour and native vegetation will be reestablished, if necessary).
12. Trash, food, food containers, and food waste will be secured at all times by individual workers, or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.
13. Project activities will avoid creation of berms and dykes, steepening of channel slopes, placement of rock slope protection, and other actions that could result in alteration of hydrology, changes to water surface elevation levels, increased flooding, changes to flow velocities, and increased scour within light-footed Ridgway's rail occupied habitat.

Conservation Measures for Contra Costa goldfields (*Lasthenia conjugens*)

To avoid and minimize potential adverse effects to the vernal pool plants, the measures listed below will be implemented in the project footprint where suitable listed branchiopod habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur.

<u>Vernal Pools</u>

1. If possible, prior to construction activities, the Service-approved biologist will conduct protocol-level bloom-season plant surveys in seasonally inundated habitats (seasonal wetland, non-inundated wetlands) within the project footprint. If any listed vernal pool plant species are found during the surveys, the Service-approved biologist will submit a

report to the Service within 1 month of completing the field work. The report will provide results of all surveys, a summary of all the data collected, and the habitat assessment. Information regarding the location of listed plant populations will be provided to CDFW's California Natural Diversity Database (CNNDB) according to their reporting protocols. If surveys are not possible, then listed vernal pool species presence will be assumed on all suitable habitats within the Action Area.

2. Flagging or other field markers identifying the plants, or in the event protocol-level surveys were not conducted – the suitable habitat, will be placed prior to each work event and removed after that work event is completed for all phases of the proposed project.
3. A Service-approved biologist will monitor all construction activities within 250 feet of suitable habitat for listed vernal pool plants to ensure that no unnecessary loss or destruction of habitat occurs.
4. A Service-approved biologist will delineate a 50-foot avoidance buffer around all listed plants or their suitable habitat. The non-disturbance exclusion zones will be established, maintained and monitored by a Service approved biological monitor to ensure that loss of listed vernal pool plants or destruction of their habitat does not occur outside of the project footprint where suitable habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur.
5. Work within 250 feet of suitable listed vernal pool plant habitat (e.g., vernal pools, seasonal wetlands) will be performed between June 1 and October 15 under dry site conditions to the maximum extent possible to minimize potential adverse impacts to aquatic habitats.
6. A Service-approved project biologist will flag or monitor all operations and maintenance work during the *dry season* (generally June 1 to October 15) within 250 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:
    a. Hand-held herbicide application is prohibited within the pool or at the edge of the pool;
    b. Power spray herbicide application is prohibited within 100 feet of the edge of the pool;
    c. Broadcast herbicide application is prohibited within 150 feet of the edge of the pool; and
    d. Ground-disturbing activities are prohibited within 25 feet of the edge of the pool.
7. If any construction activities remain and must occur during the October 15 - June 1 *wet period*, exclusion fencing and erosion control materials will be placed around the vernal pools and other seasonal wetlands as determined by the Service-approved biologist to reduce sedimentation into vernal pool habitat. The fencing will provide a buffer between construction activities and the vernal pools and other seasonal wetlands. The Service approved biologist will erect and maintain the exclusion fencing.
8. Any vernal pool, vernal pool grassland, or seasonal wetland will be protected from siltation and contaminant runoff by use of erosion control.
9. Erosion-control materials will be of a tightly woven natural fiber netting or similar material that will not entrap reptiles and amphibians (e.g., coconut coir matting). No micro-filament netting will be used.
10. Erosion-control measures will be placed between the outer edge of the buffer and the activity area. All fiber rolls and hay bales used for erosion control will be certified as free of noxious weed seed.

11. Dust control measures will be implemented to prevent the transport of soil from exposed surfaces to vernal pool, swale, and rock pool habitat. Sprinkling with water will not be done in excess to minimize the potential for non-storm water discharge.
12. A Service-approved biologist will flag or monitor all operations and maintenance work during the *wet season* (generally October 1 to June 1) within 150 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:
    a. Hand-held herbicide application is prohibited within 25 feet of the edge of the pool;
    b. Power spray herbicide application is prohibited within 100 feet of the edge of the pool;
    c. Broadcast herbicide application is prohibited within 150 feet of the edge of the pool;
    d. Manual clearing of vegetation is prohibited at the pool or beyond the edge;
    e. Mechanical clearing of vegetation is prohibited within 100 feet of the edge of the pool; and
    f. Ground-disturbing activities are prohibited within 50 feet of the edge of the pool.
13. A buffer of at least 300 feet from any vernal pool, vernal pool grassland, or seasonal wetland will be established for the following:
    a. Staging areas of all equipment for storage, fueling, and maintenance with hazardous material absorbent pads available in the event of a spill; and
    b. Mixing of pesticides, herbicides, or other potentially toxic chemicals.
14. Vehicles will be inspected daily for fluid leaks before leaving a staging area.
15. Routine maintenance activities within 250 feet of vernal pool and swale habitat will be avoided to the maximum extent possible.
16. When restoring upland areas to pre-project condition, native plants will be used to the maximum extent practicable.
17. To minimize the introduction of invasive plant species, construction vehicles will be cleaned prior to entering any vernal pool habitat.

Conservation Measures for Marbled murrelet (*Brachyramphus marmoratus*)

(a) Occupied Habitat

If marbled murrelet surveys (using the Service 2003 survey protocol; Evans Mack *et al.* 2003) determine[2] that the Action Area is occupied **or** if FEMA or the Service presumes marbled murrelet occupancy without conducting surveys, the project Subapplicant will adhere to the following Conservation Measures:

i. Vegetation Removal or Alteration of Known or Potential Nest Trees:
    a. No potential marbled murrelet nest trees[3] will be removed during the nesting season (March 24 to September 15).

[2] Surveyors are required to meet or exceed all training recommendations in Evans Mack et al. (2003), and be registered as qualified surveyors on a current Service 10(a)1(b) Recovery Permit.

[3] Potential habitat defined by Nelson et al. (2003) as: (1) mature (with or without an oldgrowth component) and old-growth coniferous forests; and (2) younger coniferous forests that have platforms (relatively flat, at least 4-inch diameter and at least 33 feet above the base of the live crown of a coniferous tree). Platform presence is more important that tree size.

b. Avoid removing or damaging known or potential nest trees, unless they are a confirmed safety hazard. For sites that have not been surveyed according to 2003 survey protocol, potential habitat is defined as (1) mature (with or without an old-growth component) and old growth coniferous forests; **and** (2) younger coniferous forest that have platforms.
c. Avoid removing or damaging trees with potential nesting platforms. A platform is a relatively flat surface at least 10 centimeters (4 inches) in diameter and 10 meters (33 feet) in height in the live crown of a coniferous tree. Platforms can be created by a wide bare branch, moss or lichen covering a branch, mistletoe, witches brooms, or other deformities, or structures such as squirrel nests.
d. Project activities will not remove the function of suitable nesting habitat.
    - While habitat elements may be removed, such as individual large trees if they are a confirmed safety hazard, from nesting habitat, the treatment must not be so extensive as to remove the overall function of the nesting habitat, and will be conducted outside of the nesting season.
e. Non-suitable nest trees or limb trimming or pruning, brush trimming or removal, and hazard tree felling within suitable habitat may occur outside of the nesting season, September 16 to March 23.

ii. Auditory, Visual, or Other Disturbance:
a. Construction equipment must be in good working order, with emphasis on hydraulic and noise abatement systems. Hydraulic leakage and damaged mufflers (or spark arresters) must be promptly addressed and remedied to the degree practicable.
b. No proposed activity generating sound levels 20 or more decibels above ambient sound levels **or** with maximum sound levels (ambient sound levels plus activity-generated sound levels) above 90 decibels (excluding vehicle back-up alarms) may occur within suitable marbled murrelet nesting habitat during the majority of the murrelet nesting season (*i.e.,* March 24 to August 5)
c. Between August 6 (date when most marbled murrelets have fledged in coastal northern California) and September 15 (end of marbled murrelet nesting season) of any year, project activities, with adjacent suitable nesting habitat, that will generate sound levels greater than or equal to 10 decibels above ambient sound levels will observe a daily work window beginning 2 hours post-sunrise and ending 2 hours pre-sunset. However, prep work that does not generate sound levels above ambient sound levels, including street sweeping and manual removal of pavement markers, can occur during all hours. The need for this daily work window depends on the distance between suitable nesting habitat and the above-ambient sound generating activity following the Service guidelines (Service 2006). For example, if above-ambient sound levels generated by proposed activities will become attenuated back down to ambient sound levels prior to reaching suitable nesting habitat, the daily work window would not be necessary.
d. No human activities will occur within visual line-of-sight of 40 meters (131 feet) or less from a known nest or suitable nest tree during the nesting season (March 24 to September 15) (Service 2006).

(b) Unoccupied Habitat

(i) If recent protocol surveys determine that all suitable marbled murrelet nesting habitat within the Action Area is considered unoccupied, the auditory, visual, and other disturbance measures listed above under iii) do not apply for habitat determined to be unoccupied.

(c) Marbled Murrelet Critical Habitat

(i) Ensure that there are no "adverse effects" to designated critical habitat for marbled murre+let within the Action Area. However, the Service has no specific quantitative thresholds, above which there would likely be an adverse effect to critical habitat. If a Subapplicant's proposed project encounters this situation, contact the Service to determine whether proposed habitat removal within designated critical habitat would constitute an adverse effect. Generally, the removal of a few small trees in unoccupied habitat would not result in adverse effect" on designated critical habitat.
(ii) When working in designated critical habitat for marbled murrelet, all measures described in Items (a) Occupied Habitat, or (b) Unoccupied Habitat for reducing impacts in suitable habitat will also be implemented. This will help reduce effects, and may result in some instances in effects that are insignificant and discountable.

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Service 2006. Estimating the effects of auditory and visual disturbance to northern spotted owls and marbled murrelets in northwestern California. Available at: http://www.fws.gov/arcata/es/birds/NSO/ns_owl.html.

Conservation Measures for Western Snowy Plover

The following avoidance and minimization measures apply to Action Areas within suitable snowy plover nesting habitat and designated critical habitat regardless of whether snowy plovers have been detected during Service approved protocol surveys.

(a) Project construction activities in suitable nesting habitat will occur during the species non-breeding season: the period beginning October 1 and continuing through February 28 of the following year; or through February 29 in a leap year.
(b) Project construction activities in suitable nesting habitat will be limited to the use of handheld tools including handheld motorized implements such as chain saws and power augers. No heavy equipment will be allowed within suitable nesting habitat.
(c) If handheld motorized implements are used, operators will employ best management practices to avoid and minimize soil and water contamination from fuel and lubricants. Measures include:

1. Use spill-resistant fuel and lubricant containers;
2. Consider the use of a portable containment pad for re-fueling in the field;
3. Immediately report petroleum spills to the landowner, or land management agency, and notify appropriate local authorities for advice and action on containment and cleanup of spills; and
4. Clearly mark the location and/or boundaries of the spill site to enable rapid remedial action.

(d) If project construction activities occur in adjacent to, but not within suitable nesting habitat, then project activities should be conducted during the species non-breeding season, if possible. If nonbreeding season construction is not possible, then the Subapplicant will employ a Service-approved biologist to conduct weekly western snowy plover surveys. If western snowy plovers are observed, the Service-approved biologist will notify the Service within 1 day of the observation and will monitor all construction activities conducted adjacent to western snowy plovers suitable nesting habitat. The qualified biologist will have the right and responsibility to stop work if adverse effects of nesting western snowy plovers are observed.

(e) When necessary to minimize the area affected by the project, the Subapplicant or their contractors will mark the work site boundaries with flagging or other visible materials, and remove those markers at the conclusion of the project.

(f) Workers will avoid temporary or permanent placement of structures (e.g., posts, railings, tall equipment, or fence lines) that could provide elevated perches for predatory birds.

(g) Access to work sites will be by foot travel only. Motorized vehicles, including all-terrain vehicles, are not permitted on work sites located within suitable nesting habitat.

(h) Vehicles used for transport of personnel will be restricted to existing parking lots or roadside parking areas.

(i) At the conclusion of the project, areas temporarily impacted by project activity will be restored to their pre-project condition (for example, footpaths are to be raked to their original ground contour and cut vegetation is to be removed or piled for future disposal).

(j) Trash, food, food containers, and food waste will be secured at all times by individual workers, or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.

(k) Pets will be prohibited from all work sites.

Conservation measures for Riverside fairy shrimp

The following conservation measures apply to any suitable Riverside 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).

1. 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 three 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 Ventura Fish and Wildlife Office (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.

2. Any projects that have the potential to result in adverse effects to Critical habitat units 1a and 1b designated for Riverside fairy shrimp in Ventura County are not included in this concurrence and will require separate consultation.
3. 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.
4. 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 following measures will be implemented as applicable.
5. Disturbance exclusion zones will be established, maintained, and monitored by a VFWO-approved biologist to ensure that impacts to basin/inundation features watershed, and/or critical habitat do not extend beyond the identified project footprint.
6. 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.
7. 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.
8. 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:
   (a) There will be no soil disturbing activities or herbicide application in a basin/inundation feature or within 25 feet of such a feature;
   (b) There will be no held herbicide application within 50 feet of a basin/inundation feature;
   (c) There will be no power spray herbicide application within 100 feet of a basin/inundation feature; and
   (d) There will be no broadcast herbicide application within 150 feet of a basin/inundation feature.
9. 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) A VFWO-approved biologist will monitor all site preparation, construction, and/or maintenance activities to occur within 150 feet of a basin/inundation feature.

Arcata & Yreka FEMA Programmatic Agreement

United States Department of the Interior
FISH AND WILDLIFE SERVICE

Arcata Fish and Wildlife Office
1655 Heindon Road, Arcata, California 95521
Phone: (707) 822-7201 FAX: (707) 822-8411

Yreka Fish and Wildlife Office
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SEP 07 2018

In Reply, Refer To:
AFWO-18B0109-18I0341 (Arcata)
08EYRE00-2018-I-0197 (Yreka)

Mr. Alessandro Amaglio
Federal Emergency Management Agency
Department of Homeland Security
1111 Broadway, Suite 1200
Oakland, California 94607

Subject: Informal Consultation on the Federal Emergency Management Agency's (FEMA) Programmatic Biological Assessment for Disaster, Mitigation, and Preparedness Programs in California for Four Species within the Jurisdictions of the Arcata and Yreka Fish and Wildlife Offices, California

Dear Mr. Amaglio:

We concur with your determinations regarding the Programmatic Biological Assessment (PBA) for Disaster, Mitigation, and Preparedness Programs in California. The Federal Emergency Management Agency (FEMA) requested our concurrence with their determinations under section 7 of the Endangered Species Act (Act) of 1973 (16 U.S.C. 1531 *et seq*.).

We received your request for concurrence and the PBA on June 21, 2018. In part, the PBA addresses four federally listed species under the jurisdictions of the Arcata Fish and Wildlife Office (AFWO) and Yreka Fish and Wildlife Office (YFWO) (Table 1). FEMA determined that adoption of the structured section 7 review processes outlined in the PBA (i.e., the proposed action) "... *may affect, but is not likely to adversely affect* ..." each of the four species and their designated critical habitats (i.e., NLAA determination).

Table 1: Four Species addressed in the PBA under the AFWO's and YFWO's jurisdiction.

Species Name				*FEMA Determinations for ...*		*Location of Conservation Measures in the PBA, and in Attachment 1 of this Correspondence*
Common Name	*Binomial or Trinomial*	*Federal Listing Status*	*Field Office Jurisdiction*	*Individuals or Populations*	*Critical Habitat*	
northern spotted owl	*Strix occidentalis caurina*	Threatened	YFWO	NLAA	NLAA	Appendix K, pages K-1 thru K-3
marbled murrelet	*Brachyramphus marmoratus*	Threatened	AFWO	NLAA	NLAA	Appendix J, pages J-1 and J-2
western snowy plover	*Charadrius nivosus nivosus*	Threatened	AFWO	NLAA	NLAA	Appendix J, page J-3
Point Arena mountain beaver	*Aplodontia rufa nigra*	Endangered	AFWO	NLAA	Not applicable	Appendix J, page J-4

Background and Geographic Scope

Under the Disaster Relief and Emergency Assistance Act of 1988 (Public Law 93-288 §§5121 *et seq.*) (Stafford Act), FEMA is authorized to grant funds to individuals and communities (both are referred to as "subapplicants" in FEMA terminology) who are adversely affected, or potentially affected, by human-caused and natural disasters. Grant programs authorized under the Stafford Act address preparedness, hazard mitigation, and disaster recovery. FEMA's fund-granting decisions are reviewable under section 7 of the Act. The purpose and need of the 2018 PBA is to enable FEMA to establish a structured section 7 review procedure that is specific to affected species, to affected sites, and to individual applications for disaster assistance.

FEMA developed its current PBA in anticipation of a continued increasing trend in the frequency and severity of disaster incidents in California including, but not limited to, severe winter storm events and wildfires. In previous years, FEMA has submitted PBAs in northern California that were linked to specific Disaster Declarations; for example, in the AFWO-YFWO jurisdictional areas, we saw a FEMA PBA following a Disaster Declaration for severe winter storms, 2005-2006. This earlier PBA also established a structured section 7 review process. However, the escalating frequency and severity of disaster incidents over the last decade has made this "single-declaration" approach infeasible. FEMA's 2018 PBA covers all disaster incidents and declarations, throughout California, and will remain in effect for a period of 5 years, with provision for review and extension, as warranted.

Rationale for the Service's Determinations

In the summer of 2017, FEMA solicited early involvement from the Service in the development of their PBA. The process continued through early winter of 2017 with weekly conference calls, frequent electronic communications, and periodic reviews of draft products. These activities tapered-off through spring of 2018 as FEMA approached completion of the PBA. During this time, the Service provided FEMA with our recommended conservation measures for the four species listed in Table 1. These measures (enclosed with this letter) have been incorporated into the PBA and will be implemented by FEMA or their subapplicants; therefore, we concur with FEMA's determinations for the four species within AFWO's and YFWO's jurisdiction.

Conclusion

The Service appreciates FEMA's collaborative approach to developing programmatic guidelines, and its efforts to minimize impacts to protected species. If you have questions about this correspondence, or need more information, please contact Christine Jordan at the Yreka Fish and Wildlife Office, (530) 842-5763; or John Peters at the Arcata Fish and Wildlife Office, (707) 822-7201.

Sincerely,

Dan Everson
Field Supervisor
Arcata Fish and Wildlife Office

~~Jenny Ericson~~ Gina Glenne
Acting Field Supervisor
Yreka Fish and Wildlife Office

Enclosures
(1) Conservation Measures for Northern Spotted Owl
(2) Conservation Measures for Marbled Murrelet
(3) Conservation Measures for Western Snowy Plover
(4) Conservation Measures for Point Arena Mountain Beaver

cc:
U.S. Fish and Wildlife Service, Region 8, Sacramento CA (Attn: Ms. Ellen McBride)
U.S. Fish and Wildlife Service, Yreka, CA (Attn: Ms. Jenny Ericson and Ms. Christine Jordan)
U.S. Fish and Wildlife Service, Carlsbad, CA (Attn: Mr. G. Mendel Steward)
U.S. Fish and Wildlife Service, Ventura, CA (Attn: Mr. Steve Henry)
U.S. Fish and Wildlife Service, Klamath Falls, OR (Attn: Mr. Todd Luke)
U.S. Fish and Wildlife Service, Bay-Delta FWO, Sacramento, CA (Attn: Ms. Kaylee Allen)
U.S. Fish and Wildlife Service, Sacramento FWO, Sacramento, CA (Attn: Ms. Jennifer Norris)
AECOM, Oakland, CA (Attn: Ms. Lorena Solorzano-Vincent)
NOAA's National Marine Fisheries Service, Sacramento, CA (Attn: Maria Rea, Assistant Regional Administrator)

Enclosures

Conservation Measures for Northern Spotted Owl

Conservation Measures for Marbled Murrelet

Conservation Measures for Western Snowy Plover

Conservation Measures for Point Arena Mountain Beaver

USFWS Conservation Measures for Northern Spotted Owl (For NLAA Coverage Only)

The following Conservation Measures are required for Subapplicant's proposed projects and their interrelated and interdependent activities that may affect the northern spotted owl (NSO). These measures are designed to reduce direct and indirect disturbance to individual NSOs, and habitat effects, to an insignificant and discountable level.

NSO-1: If the Subapplicant's proposed project is located within suitable nesting, roosting or foraging habitat (NRF) for the NSO, and may directly or indirectly affect the NSO or its habitat, contact the USFWS to obtain contact information for local Forest Service, County, or other biologists who can provide NSO survey, Activity Center[1] and habitat suitability data for the Action Area. This step will provide baseline information for the Action Area, and will help determine if and where surveys should be done, or if recent surveys have been completed.

NSO-2: If NSO surveys have not been done, or are not current per the 2012 NSO Survey Protocol guidance (depending on activity), <u>and surveys are planned</u>, conduct them according to the 2012 NSO Survey Protocol and follow the seasonal restrictions described below for 'Surveyed Landscape'. If surveys are not planned or feasible, assume occupancy based on the presence of suitable NRF habitat; adhere to the guidance and seasonal restrictions described below for operating in an 'Un-surveyed Landscape'.

- (a) As an option to the full 6-visit protocol surveys described in the 2012 NSO Survey Protocol, three surveys can be conducted in the year of action implementation. If no NSOs are detected within 0.25 mile of the proposed activities, activities may proceed that year without seasonal restrictions.

NSO-3: Surveyed Landscape – If surveys are completed or are current for the Action Area (based on surveys conducted by the applicant/project proponent, or other data provided from other agencies):

- (a) Do not conduct activities that result in loud and continuous noise above ambient levels within 0.25 mile (or 1,320 feet) of a nest site between February 1 and July 9.
  - (i) This includes activities that generate sound levels 20 or more decibels above ambient sound levels <u>or</u> activities that generate maximum sound levels above 90 decibels, excluding vehicle back-up alarms. Maximum sound levels are the combined ambient and activity-generated sound levels.
- (b) Do not conduct any suitable habitat modification or smoke-generating activities within 0.25 mile (or 1,320 feet) of a nest site between February 1 and September 15.
  - (i) Suitable habitat includes NSO NRF habitat. Modification includes cutting and removal of large trees, down logs or snags. Tree or limb trimming or pruning, brush trimming or removal, and hazard tree felling may occur as long as the noise levels described above are not exceeded during the critical breeding period of February 1-July 9.

NSO-4: Un-surveyed Landscape – If surveys have not been completed and cannot be done, assume occupancy in the Action Area/portion of it based on the presence of suitable NRF habitat:

- (a) Do not conduct activities that result in loud and continuous noise above ambient levels within 0.25 mile (or 1,320 feet) of un-surveyed suitable NRF habitat between February 1 and July 9.

[1] An Activity Center represents the 'best of detections' such as a nest tree, an area used by roosting pairs or territorial singles, or an area of concentrated nighttime detections

(i) This includes activities that generate sound levels 20 or more decibels above ambient sound levels or activities that generate maximum sound levels above 90 decibels, excluding vehicle back-up alarms. Maximum sound levels are the combined ambient and activity-generated sound levels.

(b) Do not conduct any suitable habitat modification or smoke-generating activities within 0.25 mile (or 1,320 feet) of un-surveyed suitable NRF habitat between February 1 and September 15.

(i) Suitable habitat includes NSO NRF habitat. Modification includes cutting and removal of large trees, down logs or snags. Tree or limb trimming or pruning, brush trimming or removal, and hazard tree felling may occur as long as the noise levels described above are not exceeded during the critical breeding period of February 1-July 9.

NSO-5: Equipment must be in good working order with standard noise abatement devices attached.

NSO-6: Within all suitable NRF habitat:

(a) Avoid removing or damaging known nest trees and associated screen trees, unless they are a confirmed safety hazard per the guidance documents from the implementing agency or another agency with jurisdiction in the Action Area.

(b) Avoid removing or damaging trees or snags with potential nesting platforms and associated screen trees. These include trees with large flattened tops, large broken topped trees, trees with decadence such as large cavities, mistletoe broom structures, cat faces, or large limbs; or large snags with these similar characteristics).

(c) Avoid removing large (20" diameter at breast height or larger) snags, unless they are a confirmed safety hazard per the implementing agency's guidance documents.

NSO-7: Project activities will not downgrade[2] or remove the function of suitable nesting/roosting habitat:

(a) While habitat elements may be removed, such as individual large trees or snags if they are a confirmed safety hazard, from nesting/roosting habitat, the treatment must not be so extensive as to downgrade or remove the overall function of the habitat.

(b) If the Subapplicant's proposed project would remove or downgrade nesting/roosting habitat function, this PBA is not applicable and a separate ESA consultation is warranted.

NSO-8: Within suitable foraging habitat in NSO cores (0.5 mile radius, or 500-acre area, around an Activity Center) and within suitable foraging habitat in NSO home ranges (1.3 mile radius, including core, or 3,398-acre area around an Activity Center):

(a) Avoid downgrading or removing suitable foraging habitat function.

(b) While habitat elements may be removed, such as individual trees, shrubs, down logs and snags, from foraging habitat, the treatment must not be so extensive as to downgrade or remove the overall function of the habitat in an NSO core or home range below the recommended habitat levels for supporting survival, reproduction and occupancy (USDI-FWS 2009). This level is a combination of 400 acres of suitable NRF habitat in the core. For the home range, the level is 40 percent suitable NRF (approximately 1,336 acres).

(c) If the Subapplicant's proposed project removes or downgrades suitable foraging habitat function in a core and home range to below the recommended levels, this PBA is not applicable and a separate ESA consultation is warranted.

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[2] Treatments/activities that reduce suitable habitat elements to the degree that the habitat does not function in the capacity that existed pre-treatment are considered a 'downgrade' effect (e.g., downgrade from nesting/roosting to foraging); but the treatment/activity does not remove suitable habitat function entirely. Removal of habitat function occurs when treatments//activities reduce habitat elements to the degree that the habitat no longer functions as suitable habitat.

Northern Spotted Owl Critical Habitat

NSO-9: When working in designated critical habitat, adhere to all measures described in NSO-6, NSO-7, and NSO-8 for reducing impacts in suitable nesting/roosting and foraging habitat. This will assure that effects to Physical and Biological Features (PBFs) of PBF-2 (nesting/roosting) and PBF-3 (foraging) are insignificant and discountable.

NSO-10: Adhering to these Conservation Measures (NSO-6, NSO-7, and NSO-8 above) will also assure that effects to PBF-1 and PBF-4 are insignificant and discountable, given the larger scale at which effects to these critical habitat PBFs are to be considered under the 2012 Revised Critical Habitat final rule (77 FR 71876). PBF-1 refers to forest types that may be in early, mid, or late seral stages and that support the NSO across its geographical range. PBF-4 refers to habitat that supports the transience and colonization phases of dispersal.

USFWS Conservation Measures for Marbled Murrelet (For NLAA Coverage Only)

The following Conservation Measures are required for Subapplicant's proposed projects that may affect the marbled murrelet (MAMU) and/or their habitat. These measures are designed to reduce direct and indirect disturbance to individual MAMUs, and habitat effects, to an insignificant and discountable level.

MAMU-1: Occupied Habitat

If marbled murrelet surveys (using the USFWS 2003 survey protocol; Evans Mack *et al.* 2003) determine (*) that the Action Area is occupied **or** if FEMA or the USFWS presumes marbled murrelet occupancy without conducting surveys, the project Subapplicant will adhere to the following Conservation Measures:

(i) Vegetation Removal or Alteration of Known or Potential Nest Trees:

a. No potential marbled murrelet nest trees (**) will be removed during the nesting season (24 March to 15 September).

b. Avoid removing or damaging known or potential nest trees, unless they are a confirmed safety hazard. For sites that have not been surveyed according to 2003 survey protocol, potential habitat is defined as (1) mature (with or without an old-growth component) and old growth coniferous forests; **and** (2) younger coniferous forest that have platforms.

c. Avoid removing or damaging trees with potential nesting platforms. A platform is a relatively flat surface at least 10 cm (4 in) in diameter and 10 m (33 ft) in high in the live crown of a coniferous tree. Platforms can be created by a wide bare branch, moss or lichen covering a branch, mistletoe, witches brooms, or other deformities, or structures such as squirrel nests.

d. Project activities will not remove the function of suitable nesting habitat.

- While habitat elements may be removed, such as individual large trees if they are a confirmed safety hazard, from nesting habitat, the treatment must not be so extensive as to remove the overall function of the nesting habitat, and will be conducted outside of the nesting season.

e. Non-suitable nest trees or limb trimming or pruning, brush trimming or removal, and hazard tree felling within suitable habitat may occur outside of the nesting season, 16 September to 23 March.

(ii) Auditory, Visual, or Other Disturbance:

a. Construction equipment must be in good working order, with emphasis on hydraulic and noise abatement systems. Hydraulic leakage and damaged mufflers (or spark arresters) must be promptly addressed and remedied to the degree practicable.

b. No proposed activity generating sound levels 20 or more decibels above ambient sound levels **or** with maximum sound levels (ambient sound levels plus activity-generated sound levels) above 90 decibels (excluding vehicle back-up alarms) may occur within suitable marbled murrelet nesting habitat during the majority of the murrelet nesting season (*i.e.*, 24 March to 05 August)(USFWS 2006).

c. Between August 06 (date when most marbled murrelets have fledged in coastal northern California) and September 15 (end of marbled murrelet nesting season) of any year, project activities, with adjacent suitable nesting habitat, that will generate sound levels $\geq$10 dB above ambient sound levels will observe a daily work window beginning 2 hours post-sunrise and ending 2 hours pre-sunset. However, prep work that does not generate sound levels above ambient sound levels, including street sweeping and manual removal of pavement markers, can occur during all hours. The need for this daily work window depends on the distance between suitable nesting habitat and the above-ambient sound generating activity following the USFWS guidelines (USFWS 2006). For example, if above-ambient sound levels generated by proposed activities will become attenuated back down to ambient sound levels prior to reaching suitable nesting habitat, the daily work window would not be necessary. No human activities will occur within visual line-of-sight of 40 m (131 feet) or less from a known nest or suitable nest tree during the nesting season (24 March to 15 September) (USFWS 2006).

MAMU-2: Unoccupied Habitat

(i) If recent protocol surveys determine that all suitable marbled murrelet nesting habitat within the Action Area is considered unoccupied, the auditory, visual, and other disturbance measures listed above under ii) do not apply for habitat determined to be unoccupied.

MAMU-3: Marbled Murrelet Critical Habitat

(i) Ensure that there are no "adverse effects" to designated critical habitat for marbled murrelet within the Action Area. However, the USFWS has no specific quantitative thresholds, above which there would likely be an adverse effect to critical habitat. If a Subapplicant's proposed project encounters this situation, contact the USFWS to determine whether proposed habitat removal within designated critical habitat would constitute an adverse effect. Generally, the removal of a few small trees in unoccupied habitat would not result in "adverse effect" on designated critical habitat.

(ii) When working in designated critical habitat for marbled murrelet, all measures described in MAMU-1 Occupied Habitat, or MAMU-2 Unoccupied Habitat for reducing impacts in suitable habitat will also be implemented. This will help reduce effects, and may result in some instances in effects that are insignificant and discountable.

Footnotes

(*) Surveyors are required to meet or exceed all training recommendations in Evans Mack et al. (2003), and be registered as qualified surveyors on a current USFWS 10(a)1(A) Recovery Permit.
(**) Potential habitat defined by Nelson et al. (2003) as: (1) mature (with or without an old-growth component) and old-growth coniferous forests; and (2) younger coniferous forests that have platforms (relatively flat, at least 4-inch diameter and at least 33 feet above the base of the live crown of a coniferous tree). Platform presence is more important that tree size.

Literature Cited

Evans Mack, D., W. P. Ritchie, S. K. Nelson, E. Kuo-Harrison, P. Harrison, and T. E. Hamer. 2003. Methods for surveying Marbled Murrelets in forests: a revised protocol for land management and research. Pacific Seabird Group unpublished document available at: http://www.pacificseabirdgroup.org.

U.S. Fish and Wildlife Service (USFWS). 2006. Estimating the effects of auditory and visual disturbance to northern spotted owls and marbled murrelets in northwestern California. Available at: http://www.fws.gov/arcata/es/birds/NSO/ns_owl.html.

USFWS Conservation Measures for Western Snowy Plover
(For NLAA Coverage Only)

The following Conservation Measures apply to Action Areas within suitable western snowy plover (WSP) nesting habitat and designated critical habitat regardless of whether snowy plovers have been detected during USFWS approved protocol surveys.

WSP-1: Project construction activities in suitable nesting habitat will occur during the species non-breeding season: the period beginning October 1 and continuing through February 28 of the following year; or through February 29 in a leap year.

WSP-2: Project construction activities in suitable nesting habitat will be limited to the use of handheld tools, including handheld motorized implements such as chain saws and power augers. No heavy equipment will be allowed within suitable nesting habitat.

WSP-3: If handheld motorized implements are used, operators will employ best management practices to avoid and minimize soil and water contamination from fuel and lubricants. Measures include: (1) Use spill-resistant fuel and lubricant containers; (2) Consider the use of a portable containment pad for re-fueling in the field; (3) Immediately report petroleum spills to the landowner, or land management agency, and notify appropriate local authorities for advice and action on containment and cleanup of spills; and (4) Clearly mark the location and/or boundaries of the spill site to enable rapid remedial action.

WSP-4: If project construction activities occur in adjacent to, but not within suitable nesting habitat, then project activities should be conducted during the species non-breeding season, if possible. If non-breeding season construction is not possible, then the Subapplicant will employ a Service-approved biologist to conduct weekly western snowy plover surveys. If western snowy plovers are observed, the Service-approved biologist will notify the Service within 1 day of the observation and will monitor all construction activities conducted adjacent to western snowy plovers suitable nesting habitat. The qualified biologist will have the right and responsibility to stop work if adverse effects of nesting western snowy plovers are observed.

WSP-5: When necessary to minimize the area affected by the project, the Subapplicant or their contractors will mark the work site boundaries with flagging or other visible materials, and remove those markers at the conclusion of the project.

WSP-6: Workers will avoid temporary or permanent placement of structures (e.g., posts, railings, tall equipment, or fence lines) that could provide elevated perches for predatory birds.

WSP-7: Access to work sites will be by foot travel only. Motorized vehicles, including all-terrain vehicles, are not permitted on work sites located within suitable nesting habitat.

WSP-8: Vehicles used for transport of personnel will be restricted to existing parking lots or roadside parking areas.

WSP-9: At the conclusion of the project, areas temporarily impacted by project activity will be restored to their pre-project condition (for example, footpaths are to be raked to their original ground contour and cut vegetation is to be removed or piled for future disposal).

WSP-10: Trash, food, food containers, and food waste will be secured at all times by individual workers, or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.

WSP-11: Pets will be prohibited from all work sites.

USFWS Conservation Measures for Point Arena Mountain Beaver
(For NLAA Coverage Only)

The following Conservation Measures are required for Subapplicant's proposed projects that may affect the Point Area mountain beaver (PAMB) and/or their habitat. These measures are designed to reduce direct and indirect disturbance to individual PAMBs, and habitat effects, to an insignificant and discountable level.

PAMB-1: Prior to implementing proposed vegetation-altering or ground-disturbing activities, habitat assessments and surveys for Point Arena mountain beaver must be conducted using Service-approved protocol (USFWS 2005b). Survey and habitat assessment results are valid for 2 years; if conducted within 500 feet of the Action Area. Therefore, if proposed activities do not begin within 2 years of surveys, additional surveys will need to be conducted prior to conducting the work.

PAMB-2: No vegetation removal or ground disturbance in occupied habitat or within unoccupied suitable habitat. However, roadside mowing along road rights-of-way, in occupied habitat or unoccupied suitable habitat using motorized equipment is allowed between July 1 and November 30 (i.e., the non-breeding season), provided a maximum 4-foot horizontal strip of vegetation will be mowed, to a minimum height of 2 feet.

PAMB-3: No motorized equipment with vibrating, or heavy-impact, operating capabilities (for example, vibratory steel-wheeled rollers, hand-operated vibratory compactors, concrete mixer trucks with vibrating chutes, pile-drivers), will be used within 500 feet of occupied suitable habitat during the breeding season (December 1 to June 30), and within 250 feet of occupied suitable habitat during the non-breeding season (July 1 to November 30).

PAMB-4: Night lights should be at least 250 feet from occupied suitable habitat.

PAMB-5: Heavy equipment must remain on the road prism in areas with evidence of Point Arena mountain beaver burrowing or within unoccupied suitable habitat.

PAMB-6: Staging areas will be placed in unsuitable habitat areas only or on the road prism to avoid habitat disturbance. No staging areas are allowed within occupied or unoccupied suitable habitat.

Literature Cited

U.S. Fish and Wildlife Service (USFWS). 2005. Draft guidelines for project related habitat assessments and surveys for Point Arena Mountain Beaver (*Aplodontia rufa nigra*). U.S. Fish and Wildlife Service unpublished document available at: http://www.fws.gov/arcata/es/mammals/mtnBeaver/documents/PAMB_protocol_v2.pdf

Sacramento USFWS FEMA Programmatic Agreement

Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

In Reply Refer to:
08ESMF00-
2018-F-3331-1

MAR 27 2019

Mr. Alessandro Amaglio
Regional Environmental Officer, Region IX
Federal Emergency Management Agency
1111 Broadway, Suite 1200
Oakland, California 94607

Subject: Programmatic Formal Section 7 Consultation on Federal Emergency Management Agency's Disaster, Mitigation, and Preparedness Programs within the Sacramento Fish and Wildlife Office's Jurisdiction, California

Dear Mr. Amaglio:

This letter is in response to the Federal Emergency Management Agency's (FEMA) request to initiate formal section 7 consultation under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act), and provides the U.S. Fish and Wildlife Service's (Service) programmatic biological opinion on FEMA's Disaster, Mitigation, and Preparedness Programs (proposed project) in California as described in FEMA's June 20, 2018 *Programmatic Biological Assessment for Disaster, Mitigation, and Preparedness Programs in California* (programmatic biological assessment). We received your June 20, 2018, letter requesting initiation of consultation in our Sacramento Fish and Wildlife Office (SFWO) on June 20, 2018. On September 14, 2018, we received a letter from FEMA changing effects determinations for 20 species. At issue are the effects of FEMA's proposed action on 35 federally-listed species and their designated or proposed critical habitats which the Sacramento Fish and Wildlife Office has lead responsibility and seven federally-listed species and their critical habitat which occur within the jurisdiction of the Sacramento Fish and Wildlife Office but for which other Service field offices have lead responsibility. FEMA requested formal consultation based on your determination that the proposed project may affect, and is likely to adversely affect the following 17 federally-listed species and their designated critical habitat, and may affect, but not likely to adversely affect the following 25 federally-listed species and their designated critical habitat.

Sacramento Fish and Wildlife Office Species

Likely to Adversely Affect

California red-legged frog (*Rana draytonii*) (Threatened) and critical habitat
California tiger salamander (*Ambystoma californiense*)
- Central California DPS (Threatened) and critical habitat
- Sonoma DPS (Endangered) and critical habitat

Giant garter snake (Threatened) (*Thamnophis gigas*)
Alameda whipsnake (*Masticophis lateralis euryxanthus*) (Threatened) and critical habitat
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (Threatened) and critical habitat

California freshwater shrimp (*Syncaris pacifica*) (Endangered)
Bay checkerspot butterfly (*Euphydryas editha bayensis*) (Threatened) and critical habitat
Callippe silverspot butterfly (*Speyeria callippe callippe*) (Endangered)
Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*) (Endangered)
Vernal pool fairy shrimp (*Branchinecta lynchi*) (Threatened) and critical habitat
Vernal pool tadpole shrimp (*Lepidurus packardi*) (Endangered) and critical habitat
Conservancy fairy shrimp (*Branchinecta conservatio*) (Endangered) and critical habitat
Longhorn fairy shrimp (*Branchinecta longiantenna*) (Endangered) and critical habitat
Sacramento Orcutt grass (*Orcuttia viscida*) (Endangered) and critical habitat

Not Likely to Adversely Affect
Mission blue butterfly (*Icaricia icarioides missionensis* [= *Plebejus icarioides missionensis*]) (Endangered)
San Bruno elfin butterfly (*Callophrys mossii bayensis*) (Endangered)
Burke's goldfields (*Lasthenia burkei*) (Endangered)
Butte County meadowfoam (*Limnanthes floccosa* ssp. *californica*) (Endangered) and critical habitat
Calistoga allocarya (*Plagiobothrys strictus*) (Endangered)
Colusa grass (*Neostapfia colusana*) (Threatened) and critical habitat
Contra Costa goldfields (*Lasthenia conjugens*) (Endangered) and its critical habitat
Few-flowered navarretia (*Navarretia leucocephala* ssp. *pauciflora* [=*N. pauciflora*]) (Endangered)
Fleshy owl's-clover (*Castilleja campestris* ssp. *succulenta*) (Threatened) and critical habitat
Greene's tuctoria (*Tuctoria greenei*) (Endangered) and critical habitat
Hairy Orcutt grass (*Orcuttia pilosa*) (Endangered) and critical habitat
Hoover's spurge (*Chamaesyce hooveri* [=*Euphorbia hooveri*]) (Threatened) and critical habitat
Lake County stonecrop (*Parvisedum leiocarpum* [=*Sedella leiocarpa*]) (Endangered)
Loch Lomond coyote thistle (*Eryngium constancei*) (Endangered)
Many-flowered navarretia (*Navarretia leucocephala* ssp. *plieantha*) (Endangered)
San Joaquin Orcutt grass (*Orcuttia inaequalis*) (Threatened) and critical habitat
Sebastopol meadowfoam (*Limnanthes vinculans*) (Endangered)
Slender Orcutt grass (*Orcuttia tenuis*) (Threatened) and critical habitat
Solano grass (*Tuctoria mucronata*) (Endangered) and critical habitat
Sonoma sunshine (*Blennosperma bakeri*) (Endangered)

Carlsbad Fish and Wildlife Office Species

Likely to Adversely Affect
Least bell's vireo (*Vireo bellii pusillus*) (Endangered)

May Affect, Not Likely to Adversely Affect
California least tern (*Sterna antillarum browni*) (Endangered)
Southwestern willow flycatcher (*Empidonax traillii extimus*) (Endangered) and critical habitat

Ventura Fish and Wildlife Office Species

Likely to Adversely Affect
Tidewater goby (*Eucyclogobius newberryi*) (Endangered) and critical habitat

Arcata Fish and Wildlife Office Species

May Affect, Not Likely to Adversely Affect
Western snowy plover (*Charadrius nivosus* ssp. *nivosus*) (Threatened) and critical habitat

Marbled murrelet (*Brachyramphus marmoratus*) (Threatened) and critical habitat

Yreka Fish and Wildlife Office Species

May Affect, Not Likely to Adversely Affect
Northern spotted owl (*Strix occidentalis caurina*) (Threatened) and critical habitat

Based on our review of the information provided in FEMA's June 20, 2018, programmatic biological assessment, the Service concurs that the proposed project may affect, but is not likely to adversely affect the 25 federally-listed species listed above and their respective critical habitat. The general avoidance and minimization measures and species-specific conservation measures will help ensure that adverse effects to the species from proposed project activities are likely to be insignificant. If any activity proposed by a FEMA Subapplicant (entity that has applied to receive a FEMA grant administered by the state or federally-recognized tribe) demonstrates the potential to adversely affect any of these 25 species or their critical habitat, that project will not be covered by this programmatic biological opinion and FEMA will submit that project for formal consultation.

The remainder of this document provides our programmatic biological opinion on the effects of the proposed action on the remaining 17 species.

This programmatic biological opinion is based on information provided in the following: (1) FEMA's *Programmatic Biological Assessment for Disaster, Mitigation, and Preparedness Programs in California*, dated June 20, 2018; (2) FEMA's September 14, 2018 letter changing effects determinations for 20 species; (3) conversations and emails between the Service (C. Martin and J. Knight) and FEMA staff or their contracted agents, (S. Amaglio, L. Solorzano-Vincent.); (4) conversations between FEMA and other Service biologists from the Ventura, and Arcata Fish and Wildlife Offices; and (4) information contained in Service files.

A complete administrative record of this consultation is on file at the Sacramento Fish and Wildlife Office (Service File No. 08ESMF00-2018-F-3331).

Consultation History

March 2017 – January 2018	Weekly coordination calls between the Sacramento Fish and Wildlife Office, other Service field offices, and FEMA.
March 2017 – May 2018	Correspondence exchange and meetings between the Sacramento Fish and Wildlife Office, other Service field offices, and FEMA.
January 11, 2018	Received the Draft Programmatic Biological Assessment from FEMA.
April 17, 2018	Received additional supplemental information for the Draft Biological Assessment.
May 2, 2018	Provided final comments on the Draft Programmatic Biological Assessment.
June 20, 2018	Received a Programmatic Biological Assessment from FEMA.

September 14, 2018	Received a letter from FEMA changing the effects determinations for 20 species from Likely to Adversely Affect to Adversely Affect.

PROGRAMMATIC BIOLOGICAL OPINION

Scope of the Consultation

This document is a programmatic biological opinion for FEMA's disaster, mitigation, and preparedness program (proposed action) within the Sacramento Fish and Wildlife Office's Jurisdiction in California. This is designed to facilitate FEMA's compliance with the Act for projects of a similar nature that occur as a result of Presidentially-declared disasters, and that are likely to adversely affect 17 federally-listed species and their respective designated or proposed critical habitats within the Sacramento Fish and Wildlife Office's jurisdiction. It is intended to provide Section 7(a)(2) compliance to FEMA for the proposed projects from applicants and sub-grantees (Subapplicants) requesting funding under FEMA's disaster, mitigation, and preparedness program in California. It does not cover emergency consultations or FEMA's implementation of the National Flood Insurance Program.

This programmatic biological opinion will cover a period of five years from the signature date of this document, with the potential for extension if warranted. When the 5-year period has expired or incidental take coverage under this programmatic biological opinion is met, FEMA may reinitiate a consultation to extend or amend the coverage provided in this programmatic biological opinion.

This programmatic biological opinion only applies to FEMA Subapplicants' proposed projects for which FEMA is the Lead Federal Agency for compliance under 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) among FEMA, USACE, Service, and NMFS will be followed to determine whether FEMA or the USACE is the lead federal agency for compliance with the Act.

Procedure to Cover Individual Projects Under this Programmatic Biological Opinion

To determine a Subapplicant's proposed project eligibility for coverage under this programmatic biological opinion, FEMA will determine whether a Subapplicant's proposed project meets the suitability criteria established under FEMA's programmatic biological assessment. If the proposed project meets the suitability criteria, FEMA will conduct a project-specific effects analysis and provide a summary of the potential direct and indirect effects associated with the covered project by submitting a completed ESA Review Form to the Service (Appendix C, programmatic biological assessment). If the covered project may result in adverse effects to species, the ESA Review Form will include:

- A brief description of the potential effects and mechanisms of take;
- A description of the general avoidance and minimization measures, the species-specific Conservation Measures, and any additional measures developed specifically for the project that the Subapplicant will implement; and
- A quantification of the incidental take anticipated.

FEMA will submit the completed ESA Review Form to the Service and request concurrence that the project is applicable for coverage under the programmatic biological opinion. The Service will notify FEMA by electronic mail whether the Service does or does not concur with the proposed project's coverage under the programmatic biological opinion.

Description of the Proposed Programmatic Actions

Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S. Code [U.S.C.] §§ 5121–5206), as amended, FEMA is authorized to provide grant funding to state and local governments, federally-recognized tribe and individuals (referred to as Subapplicants) who are adversely affected or potentially affected by human-caused or natural disasters. FEMA provides such grants to assist Subapplicants in repairing, restoring, or replacing disaster-damaged facilities, and to provide assistance with actions that will reduce or eliminate threats to public health and safety and reduce the risk of damage to public and private property during future disasters. FEMA has determined through experience with other disasters that the majority of the typically recurring actions proposed for funding can be grouped by type of action or location. Some of these projects may directly or indirectly affect federally-listed species and their designated or proposed critical habitats. FEMA's programmatic biological assessment contains a comprehensive description of all potential actions. These are summarized below.

<u>Non-Emergency Debris Removal</u>

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 rock and earth from landslides caused by events such as earthquakes or heavy rains; and
- Removing rubble after earthquakes.

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.

<u>Constructing, Modifying or Relocating Facilities</u>

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

- Upgrading or otherwise modifying facilities;
- Providing temporary facilities;
- Acquiring and demolishing existing facilities;
- Repairing, realigning, or otherwise modifying roads, trails, utilities, and rail lines;
- Constructing new facilities or relocating existing facilities;
- Relocating the function of an existing facility; and
- Developing demonstration projects.

During construction, avoidance and minimization measures are typically used and incorporated as part of the action. These typical measures are described later in this document.

Upgrading or Otherwise Modifying Facilities

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:

- Making structures more fire-resistant (e.g., by replacing roofs and doors with fire-resistant materials);
- Installing bracing, shear panels, shear walls, anchors, or other features so that structures are better able to withstand seismic events or high wind or snow loads;
- Modifying structures to reduce the risk of damage during floods by elevating structures above the expected flood level or by flood proofing; and
- Modifying structures to meet another need of a Subapplicant, such as through an improved project or an alternate project under the Public Assistance Program.

Providing Temporary Facilities

FEMA may provide temporary housing facilities when a disaster renders homes uninhabitable for long periods. Such facilities typically consist of manufactured housing. Typical activities may involve:

- Developing the pads for dwellings;
- Constructing ancillary facilities, such as roads, streets, and parking lots;
- Installing utilities, such as potable water lines, sewer hookups, electricity (including street lighting), and telephones lines; and
- Installing manufactured homes.

FEMA may provide temporary facilities if other housing options are not feasible. Appropriate sites will not be located in a floodplain and do not contain wetlands or critical habitat, affect historic properties or archaeological sites, or contain hazardous materials. Installation of housing units and utilities will be accomplished in accordance with current codes and standards. After temporary housing is no longer needed at the disaster site, FEMA will remove the temporary housing units and associated ancillary facilities, and restore the land to its original use. All removed materials will be stored for future use or disposed of in accordance with applicable laws and regulations.

Another method that FEMA uses to provide temporary housing involves modifying existing facilities to serve as temporary housing. These facilities may consist of existing residential property or the adaptive reuse of non-residential facilities. Specific activities range from conducting repairs and minor upgrades to complete reconstruction of a building's interior. This action may involve acquisition or leasing of facilities. Modifying existing facilities for temporary housing may be conducted by FEMA directly or by providing funding to a Subapplicant.

FEMA also may provide funding for temporary relocation of essential public services, in the event that the structures housing these services are damaged, destroyed, or otherwise rendered inaccessible by a disaster. Funds also may be provided for upgrades necessary to meet current codes and standards, and for the installation or modification of appurtenances, such as utilities, that are necessary to operate facilities.

Acquiring and Demolishing Existing Facilities

FEMA may provide funds for the acquisition and demolition of existing facilities, particularly if they are located in high-hazard areas and are subject to repetitive loss. Typically, these facilities are at a high risk because of: (1) damage from flooding; (2) erosion of stream banks, beaches, slopes, or bluffs; (3) landslides; or (4) wildfire. These facilities may consist of private properties, such as houses and commercial buildings, or publicly owned facilities, such as utilities, roads, and bridges.

Existing facilities will be either removed or demolished. All demolition materials will be disposed of at approved and licensed disposal sites, in compliance with applicable laws and regulations. Any hazardous materials or other contaminants will be removed and disposed of in an appropriate manner. Construction debris and household materials may be recycled if recycling facilities exist. Once structures are removed, lots will be graded to conform to the local topography, and disturbed areas will be revegetated with species approved for the local area.

Repairing, Realigning or Otherwise Modifying Roads, Trails, Utilities and Rail Lines

Roads, trails, utilities (water, sewer, natural gas, power/electrical systems infrastructure), and rail lines are typically damaged when floods or heavy rains cause erosion, subsidence, or landslides. Earthquakes may cause similar damage. Repairs are accomplished by replacing earthen material lost during the disaster and replacing the damaged surface, utility line, or, in the case of rail lines, ballast, and track. Stabilizing the replacement fill using rock, grout, timber walls, or steel sheet piling may be necessary. Hazard mitigation measures may be performed to prevent or limit future damage. For example, a pipe may be installed to convey drainage beneath a road, thus preventing future washouts, or a utility line may be encased in concrete in an area vulnerable to erosion.

If the area of damage is unstable, does not allow for repair, or is subject to repetitive loss, a facility may be realigned so that the area of damage is avoided. Property acquisition or a change in easement may be necessary.

Facilities may also be modified as part of improved projects or alternate projects under the Public Assistance Program to meet additional needs of the Subapplicant.

Constructing New Facilities or Relocating Existing Facilities

If a facility is located in a floodplain or other hazardous area, is subject to repetitive damage, or has been damaged in such a way that restoration in the current location is not practical or cost-effective, FEMA may fund the construction of a new facility or the physical relocation of the existing facility. FEMA defines hazardous areas as those areas susceptible to some type of natural hazard, such as flooding, seismic activity, coastal inundation, or mudslide. Examples of this action include construction of roads, trails, utilities and utility lines, and rail lines in a different area from the existing facility; construction and relocation of buildings; construction of safe rooms; and construction of drainage improvements.

In both new facility construction and physical relocation, FEMA may fund the cost of land acquisition and the construction of appurtenant features, such as access roads and utilities. For properties in the hazard area, FEMA acquires damaged properties, demolishes existing structures (except in cases of physical relocation), and places deed restrictions that limit future uses to open space in perpetuity. However, FEMA does not acquire land directly nor does it become a land owning agency as a result of this process.

Relocating the Function of an Existing Facility

FEMA may fund relocating the function of a facility to an existing facility that has adequate capacity to handle the additional load with minor modifications, if necessary. For structures, the occupants and materials are relocated to alternative structures, traffic may use alternate routes, and utility services are provided by alternative methods. This action will not entail any major physical construction or addition to the existing facility and, if any work is required, it will consist only of minor modifications. For properties in the hazard area, FEMA may acquire damaged properties, demolish existing structures, and place deed restrictions to limit future uses to open space in perpetuity.

Developing Demonstration Projects

Demonstration projects focus on public education and are designed to highlight procedures the public can use to reduce property damage during flood, earthquake, wildfire, wind, and rainstorm disasters. Demonstration projects may involve the development of a model facility to demonstrate how hazard mitigation technologies can be used to reduce potential damage during a disaster. Flood demonstration projects may involve items such as elevating a structure or waterproofing windows and doors that are below the base flood elevation. A fire demonstration project may include vegetation management around a facility and replacing roofs, doors, and windows with fire-resistant materials. Wind and earthquake demonstration projects may include changes to the structural design of buildings to allow them to withstand higher wind velocity or more movement during an earthquake.

<u>Actions Involving Watercourses and Coastal Features</u>

Many FEMA funded activities pertain to inland water sources, such as streams, rivers, lakes, and coastal features such as harbors and beaches. Inland water sources may be perennial or dry during the summer months. During construction, avoidance and minimization measures typically will be used and incorporated as part of the action. Work in a stream channel often includes temporary diversion of the channel using sandbags or a cofferdam constructed of fill. Heavy equipment typically is operated from an adjacent road, bank, or other feature; however, in some cases, operating equipment in a channel area once flow has been diverted may be necessary. A pipe or a temporary secondary channel may be used to convey the diverted water.

If the action involves channel modifications, changes to the capacity of bridges and culverts, or the installation of attenuation structures, conducting hydraulic/hydrologic analyses to evaluate the changes of upstream and downstream flow rates and determine whether additional action components need to be added to address any changes in hydraulics and hydrology outside the project area may be necessary.

Relevant categories of activities include the following:

- Repairing, stabilizing, or armoring embankments;
- Creating, widening, clearing, or dredging a waterway;
- Constructing or modifying a water crossing;
- Constructing or modifying a water detention, retention, storage, or conveyance facility;
- Constructing or modifying other flood control structures; and
- Constructing or modifying a coastal feature.

Repairing, Stabilizing or Armoring Embankments

Repairing, stabilizing, or armoring embankments involves the repair of earthen or rock embankments damaged by floodwaters. Examples are natural stream banks; road, trail, and rail line embankments; embankments for irrigation and navigation canals; and levees used for flood control and reclamation. In addition to repair of damaged features, FEMA may fund measures designed to prevent damage in future flood events.

In addition to replacing fill material, embankments may be stabilized or armored through:

- Placing of rock riprap;
- Hardening with concrete or soil cement;
- Installing retaining walls, gabions, or geotextile fabrics; and/or
- Using bioengineering techniques, such as planting vegetation, placing root wads, or placing willow bundles.

A combination of these techniques may be employed. For example, rock and geotextiles, when used with root wads and willow bundles, may provide mitigation from erosion while enhancing the natural values of a stream corridor.

Creating, Widening, Clearing or Dredging a Waterway

Creating, widening, clearing, or dredging a waterway may be used to reduce the flood hazard to adjacent lands, facilities, or populated areas. New channels may be constructed to convey excess flows around flood-prone areas during flood events. Drainage swales, earthen channels, concrete channels, or subsurface concrete pipes also may be used as a means of conveyance. A new channel may be constructed in a dry environment and connected to a stream after completion. This channel may have an inlet weir higher than the elevation of the normal flow so that the normal flows remain in the natural channel. The outlet may be armored with concrete or rock riprap to prevent excessive erosion of the existing channel.

Existing channels may be widened to allow a channel to convey a larger volume of water. Conveyance may also be increased by replacing earthen banks or channel bottoms with concrete. To the extent possible, construction will be conducted from the top of the bank, but many activities may require construction equipment to work in the stream channel. In perennially flowing streams, work in a stream channel generally will be restricted to the low-flow period, and the flow will be diverted around the construction area. A pipe or a temporary secondary channel will be used to convey the diverted water.

As an alternative to constructing a bypass or modifying an existing channel, the existing channel may be cleared of vegetation or sediment to increase conveyance. This action often will be used in developed areas where modifications are not feasible, as well as in areas where years of inadequate maintenance have allowed trees and brush to grow within the channel or sediment and debris to accumulate in the channel or around culverts and bridges. Vegetation may be removed through mechanical means, by hand, or by application of herbicides. Vegetation may be removed not only from the channel but also from the banks and high-water areas, thus reducing the risk that floating debris could be trapped by trees or heavy brush. Sediment and debris may be removed by dredging, through use of heavy equipment, or by hand. All removed debris will be disposed of at approved and licensed disposal sites, in compliance with applicable laws and regulations. Woody debris and vegetation can be recycled if recycling facilities exist.

Constructing or Modifying Water Crossings

FEMA may fund the repair or replacement of damaged water crossings, the enlargement of openings to allow greater conveyance and reduce the risk that debris may be trapped during floods, or the installation of bank protection or other means to reduce the risk of erosion. Crossings may be relocated or improved to avoid high-hazard areas, repetitive damage, or areas where reconstruction is not cost-effective or feasible.

Culverts may consist of corrugated metal pipes, reinforced concrete pipes, or reinforced concrete box culverts. The capacity of a culvert crossing may be increased to reduce the risk of flooding to the surrounding area, or the culvert may be modified to prevent overtopping or erosion of the crossing. Typical measures include:

- Increasing the size of a culvert or adding culvert barrels;
- Replacing or changing the type of culvert;
- Changing the location or alignment of a culvert; and
- Adding features, such as a headwall, discharge apron, or riprap to reduce the risk of erosion or damage to a culvert or the crossing.

Similarly, 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:

- Widening existing openings or constructing new openings;
- Reconfiguring bracing to reduce the risk that debris will be trapped;
- 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.

A bridge may be installed to replace a culvert to increase the flow capacity of a crossing. Low-water crossings may be installed or improved as an alternative to repairing or replacing a culvert or bridge. Constructing or upgrading a low-water crossing typically involves hardening the banks and bottom of a water body. A temporary diversion may be necessary during construction activities.

Constructing and Water Detention, Retention, Storage or Conveyance Facility

Constructing a water detention, retention, storage, or conveyance facility may include the construction, enlargement, or restoration of detention basins, retention basins, sediment ponds, reservoirs, or conveyance facilities, such as irrigation ditches or flumes, to reduce flood flows or to provide a water source for fighting fires in an area of high fire hazard. The creation and/or enlargement of water storage reservoirs is most frequently associated with flood disasters and to a lesser extent, fire disasters.

Detention basins, retention basins, sediment ponds, and reservoirs will be constructed to temporarily store floodwater to reduce downstream peak flows. The stored water will be released at a slower rate so that the existing drainage-ways can convey water without contributing to downstream flooding. All areas disturbed during the construction of these features will be revegetated with native plant species. This action also will include the repair or restoration of water retention or conveyance structures. All sediment removed from these features will be disposed of in a manner consistent with Federal, State, and local laws and regulations.

In rural areas, firefighting may be constrained by the lack of water readily accessible to firefighters. In response to this need, proposed activities also may include the creation of retention facilities in locations that firefighters can readily access, either as a direct source of water or as a source of water to fill water supply trucks. All areas disturbed during the construction of a retention facility will be revegetated with native plant species.

Constructing Other Flood-Control Structures

A flood-control structure is a facility designed to prevent floodwaters from entering a flood-prone area. Typical examples are levees (also referred to as dikes) and floodwalls. Activities include:

- Repairing damaged facilities, usually during emergency situations;
- Installing embankment protection;
- Raising the height of existing facilities to prevent overtopping in future floods;
- Constructing new facilities to protect flood-prone areas from damage during future floods; and
- Modifying or installing interior drainage systems to reduce the risk of damage behind levees and floodwalls during heavy rains or flooding events on tributary streams.

Levees will be repaired or constructed using compacted fill and, in some cases, riprap protection. Bare earth will be seeded with grasses to prevent erosion. Typically, a gravel road will be installed on the levee's crest to allow for maintenance. Floodwalls, typically built in urban areas, will be constructed using reinforced concrete or grouted, reinforced concrete block. Excavation will be necessary to install footings. Levees and floodwalls both will have interior drainage systems that may include pumps for removing accumulated water.

Constructing a Coastal Feature

Constructing a coastal feature may involve the repair, replacement, or construction of facilities in coastal environments, such as estuaries, inlets, harbors, and beaches. These facilities include:

- Recreational facilities, such as piers and boat ramps;
- Facilities for maritime use, such as docks and slips;
- Shoreline protection devices, such as seawalls, groins, jetties, and revetments; and
- Coastal flood-control structures, such as levees.

Construction activities are expected to occur in water and involve driving piles, placing rock or soil, or dredging sand, mud, or other sediment.

<u>Wildfire Risk Reduction</u>

Vegetation management is intended to reduce the risk of loss and damage due to wildfire and, as described above under "Actions Involving Watercourses and Coastal Features", increase the ability of channels to convey flows, thus reducing the risk of flood damage. Vegetation management for wildfire risk reduction may be accomplished using mechanical means, hand-clearing, application of herbicides, or grazing. 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.

Relevant categories of activities are:

- Mechanical or hand clearing of vegetation;
- Herbicidal treatments; and
- Biological control.

Mechanical or Hand Clearing of Vegetation

Mechanical or hand clearing of vegetation will be used for the selective removal of vegetation so that a certain proportion of vegetation is left in place. This is done to reduce the amount of vegetative fuels in an area where mechanical removal of vegetation is impractical or the remaining vegetation needs to be protected. Per FEMA's Wildfire Mitigation Policy vegetation may be removed to create defensible space around buildings and structures, and to protect life and property beyond defensible space perimeters but proximate to (less than 2 miles from) at-risk structures. The creation and maintenance of firebreaks, access roads, and staging areas are not eligible for FEMA funding.

In mechanical removal, heavy equipment will be used to uproot, crush, pulverize, or cut the trees and brush being removed. Hand removal will involve the use of chainsaws, axes, and hoes to cut and uproot vegetation. Depending on the location of the vegetation removal project and State and local regulations, vegetation downed as a result of mechanical or hand removal will be piled and burned onsite, chipped and spread onsite, or loaded and hauled away from the site. After the removal of the targeted vegetation, cleared areas may be revegetated with native, fire-resistant species. Vegetation hauled offsite can be recycled but must be disposed of in accordance with appropriate requirements.

Herbicidal Treatments

Activities generally associated with herbicidal treatment include the removal of targeted exotic invasive species within specific areas and the prevention of growth and re-sprouting of undesirable vegetation once an area has been cleared of excessive vegetation by mechanical removal and/or hand removal. Only U.S. Environmental Protection Agency-approved herbicides will be used to control the growth of undesired vegetation in a manner consistent with labeling instructions and applicable Federal and State regulations. After treatment, some areas may be revegetated with native vegetation that is fire resistant.

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

<u>General Avoidance and Minimization Measures</u>

The general avoidance and minimization measures described in this section will be implemented, as appropriate, to reduce the identified potential adverse effects from a Subapplicant's proposed project. The Subapplicant will be responsible for implementation of the avoidance and minimization measures that FEMA identifies as necessary for the proposed project.

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-16 Biological Monitor: If a project involves activities that may result in take of a covered species, as defined by the Act, a Service-approved biologist will be present onsite for all construction activities that occur within 100 feet of habitat for those species. If a Service-approved biologist is needed, the Subapplicant will submit the biologist's qualifications to the Service for approval 30 days prior to project construction. The Service-approved biologist will ensure that all applicable avoidance and minimization measures in the programmatic biological opinion are implemented during project construction. The Service-approved biologist 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 Service-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 Service-approved biologist will oversee construction activities to ensure that no covered species and/or their habitats are adversely affected. The Service-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.

Approval requests from the Subapplicants for Service-approved biologists shall include, at a minimum:

a. Relevant education;
b. Relevant training concerning the listed species for which approval is requested, including species identification, survey techniques, handling individuals of different age classes, and handling of different life stages by a permitted biologist or recognized species expert authorized by the Service for such activities;

c. A summary of field experience conducting requested activities (to include project/research information);
d. A summary of biological opinions under which they were authorized to work with the requested species and at what level (such as construction monitoring versus handling), this will also include the names and qualification of persons under which the work was supervised as well as the amount of work experience on the actual project;
e. A list of Federal Recovery Permits [10(a)1(A)] held or under which they are authorized to work with the species requested (to include the permit number, authorized activities and name of permit holder); and
f. Any relevant professional references with contact information.

GEN AMM-17 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 Service-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 programmatic biological opinion.

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.

GEN AMM-20 Revegetation of Stream Banks: For projects that require revegetation of stream and riverbanks as a result of riparian vegetation removal during construction 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 construction 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 Service-approved biologist in accordance with applicable Service 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.

Species-Specific Conservation Measures

In cases where the species-specific Conservation Measures are duplicative of the General Avoidance and Minimization Measures, the most comprehensive measure (i.e., the measure providing the most restriction) will apply.

California Red-Legged Frog California Tiger Salamander, Central California DPS, California Tiger Salamander, Sonoma DPS

To reduce potential effects to the California red-legged frog and Sonoma and Central California tiger salamander Distinct Population Segments (DPSs) (California tiger salamander), the following measures to avoid and minimize adverse effects to the California red-legged frog and California tiger salamander and their critical habitat will be incorporated into the proposed project. These measures will be communicated to the contractor through the use of special provisions included in the contract bid solicitation package.

CRLF-CTS-1 Biological Monitor: A SFWO-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 unavoidable, 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 SFWO-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 SFWO-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 SFWO-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 entries, etc.

CRLF-CTS-5 Daily Clearance Surveys: The SFWO-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/WEF 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 Project Manager and the SFWO-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 SFWO-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 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.

g. With prior approval from the Service, a hybrid ESA/WEF fencing material that is both hi-visibility and impermeable to wildlife movement may be used in place of paired ESA fencing and WEF fencing.

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 SFWO-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 SFWO-approved biologist will be notified immediately and the SFWO-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 SFWO-approved biologist will be notified. Based on the professional judgment of the SFWO-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 SFWO-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 and California tiger salamander without a SFWO-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 and 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.

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 SFWO-approved biologist will implement the species observation and handling protocol outlined below. Only SFWO-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 SFWO-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 2003c). 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 the Sonoma and

Central 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 SFWO-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. 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). Holding/transporting containers and dip nets will be thoroughly cleaned, disinfected, and rinsed with freshwater prior to use 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 SFWO-approved biologist determines the injury is minor or healing and the salamander is likely to survive, the salamander will be released immediately, consistent with measure 12.b above. The California red-legged frogs and the Sonoma and Central California tiger salamander will be monitored until it is determined that it is not imperiled by predators or other dangers.
d. If the SFWO-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 SFWO-approved biologist, or designee, will immediately take it to a SFWO-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 SFWO-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 observe 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 SFWO-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 Environmentally Sensitive Areas (ESAs) and Wildlife Exclusion Fencing (WEF).

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

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 SFWO-approved biologist will be present during all vegetation clearing and grubbing activities. Prior to vegetation removal, the SFWO-approved biologist will thoroughly survey the area for California red-legged frogs and California tiger salamanders. Once the SFWO-approved biologist has thoroughly surveyed the area, clearing and grubbing may continue without further restrictions on equipment; however, the SFWO-approved biologist will remain onsite to monitor for California red-legged frogs and California tiger salamanders until all clearing and grubbing activities are complete.

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. No erosion control materials that use plastic or synthetic monofilament netting will be used.
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 SFWO-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 SFWO-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 programmatic biological opinion. 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 species.

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.

Giant Garter Snake Conservation Measures

GGS-1 Seasonal Avoidance: To the extent practicable, confine construction activity within 200 feet of giant garter snake habitat to the period between May 1 and October 1. This is the active period for giant garter snake and direct mortality is lessened because snakes are expected to actively move and avoid danger.

GGS-2 Site Restrictions: Work activities will be restricted to existing roads and trails to the maximum extent possible. When existing roads and trails cannot be followed, and disturbance is giant garter snake habitat, vegetation will be removed by hand to prevent mortality associated with mowers and other landscaping equipment. Project-related vehicles will observe a 15-mph speed limit within construction areas and access roads (except on County road and state and federal highways). This is particularly important during the time period when the snake may be sunning or moving along roadways.

GGS-3 Clearance Surveys: Within 24 hours prior to the commencement of construction activities, the Action Area will be surveyed for giant garter snakes by a SFWO-approved biologist. The biologist will provide the Service with a written report (e-mail is acceptable) that adequately documents the pre-construction survey results within 24-hours of commencement of construction activities. The Action Area will be re-inspected by the SFWO-approved biologist whenever a lapse in construction activity of 2 weeks or greater has occurred. If a giant garter snake is encountered during surveys, cease activities until the SFWO-approved biologist has determined that the snake will not be harmed or the snake leaves the work area on its own.

GGS-4 Dewatering: Aquatic habitat for the snake will be dewatered, and then remain dry and absent of aquatic prey for 15 days prior to the initiation of construction activities. If complete dewatering is not possible, the Service will be contacted to determine what additional measures may be necessary to minimize effects to the snake.

GGS-5 Fencing: Prior to October 1st and after aquatic habitat has been dewatered, high visibility fencing will be erected along the edge of construction areas bordering suitable giant garter snake habitat to identify and protect these areas from encroachment of personnel and equipment. These areas will be avoided by all construction personnel. The fencing will be inspected by the Subapplicant before the start of each work day and maintained by the Subapplicant until completion of the project. Fencing will be established in the uplands immediately adjacent to aquatic snake habitat and extending up to 200 feet from construction activities. Snake exclusionary fencing will be buried at least six inches below the ground to prevent snakes from attempting to burrow or move under the fence. To prevent giant garter snake from becoming entangled, trapped, or injured, erosion control materials that use plastic or synthetic monofilament netting will not be used in the Action Area. Acceptable materials include natural fibers such as jute, coconut, twine or other similar fibers.

GGS-6 Contacting the Service: If construction activities in giant garter snake habitat are necessary between October 2 and April 30, the Service's SFWO will be contacted to determine whether additional measures are necessary to avoid and minimize take. Recommended measures will be implemented.

GGS-7 Biological Monitor: A SFWO-approved biologist will inspect and monitor all construction-related activities within the Action Area to attempt to minimize take of the snake or the destruction of its habitat. If snakes are encountered during construction activities, the biologist will notify the SFWO immediately to determine the appropriate procedures. A report will be submitted, including date(s), location(s), habitat description, and any corrective measures taken to protect the snake, within one (1) business day.

GGS-8 Reporting: The SFWO-approved biologist will be required to report any take of listed species to the SFWO immediately by a written letter addressed to the appropriate Service office within one (1) working day of the incident.

Alameda Whipsnake Conservation Measures

The Subapplicant will implement the following measures in Alameda whipsnake supporting habitat:

AWS-1 Environmental Awareness Training: Prior to construction, a SFWO-approved biologist with experience in the ecology and identification of the Alameda whipsnake will conduct an education program for all construction personnel, including contractors and subcontractors. Interpretation will be provided for non-English speaking workers. The same instruction will be provided to any new workers at the site before they are authorized to perform project work. Fact sheets conveying this information and color photographs of the species will be prepared for distribution to the above-mentioned people and anyone else who may enter the Action Area. The program will include, at a minimum:

a. a brief description of the species and their habitat needs;
b. any reports of occurrences in the Action Area;
c. an explanation of the species' status and protection under the Act;
d. communication and work stoppage procedures in case an individual is observed within the Action Area; and
e. a list of avoidance and minimization measures being taken to reduce effects to the species during construction and implementation.

AWS-2 Site Restrictions: The following site restrictions will be implemented to avoid or minimize effects on the Alameda whipsnake 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. Routes and boundaries of roadwork will be clearly marked prior to initiating construction or grading.
d. To the maximum extent practicable, any borrow material will be certified to be non-toxic and weed free.
e. All food and food-related trash items will be enclosed in sealed trash containers and properly disposed of offsite.
f. No pets will be allowed anywhere in the Action Area during construction.

AWS-3 Biological Monitor: The SFWO-approved biologist will be onsite during initial ground-disturbing activities, and thereafter as needed to fulfill the role of the approved biologist as specified in project permits. The SFWO-approved biologist will keep copies of applicable permits in their possession when onsite. Through the Resident Engineer, Project Manager or their designee, the SFWO-approved biologist will have the authority to communicate either verbally, by telephone, e-mail or hardcopy with all project personnel to ensure that take of listed species is minimized and permit requirements are fully implemented. Through the Resident Engineer, Project Manager or their designee, the SFWO-approved biologist will have the authority to temporarily stop project activities to minimize take of listed species or if they determine that any permit requirements are not fully implemented. If the SFWO-approved biologist exercises this authority, the SFWO will be notified by telephone and e-mail within 24 hours.

AWS-4 Habitat Avoidance: During project implementation, avoid the following habitats for this species:

a. To the extent possible, all rock outcroppings will be avoided.
b. Ground disturbance and vegetation clearing in scrub/chaparral habitat will be avoided to the maximum extent possible. Where disturbance cannot be avoided in this habitat type, work will be limited to the fall season of September to November in order to allow the young of the year time to become sufficiently capable of escaping such activities.

AWS-5 Seasonal Avoidance: Construction activities will occur between June 15 - October 31, when Alameda whipsnakes are more active, capable of escaping, and less likely to be impacted.

AWS-6 Use Hand Operated Equipment: Work activities will be restricted to existing roads and trails to the maximum extent possible. When existing roads and trails cannot be followed, shrub vegetation will be removed by equipment operated by hand to prevent mortality associated with mowers or other large mechanical equipment. A SFWO-approved biologist experienced in identifying Alameda whipsnake will be present during vegetation removal.

AWS-7 Pre-construction Surveys: Pre-construction surveys for the Alameda whipsnake will be conducted by the SFWO-approved biologist no more than 20 calendar days prior to any initial ground disturbance within Alameda whipsnake habitat. These surveys will consist of walking the project limits and, if possible, any accessible adjacent areas within at least 50 feet of the project limits. The SFWO-approved biologist will investigate potential cover sites when it is feasible and safe to do so. This includes thorough investigation of mammal burrows, rocky outcrops, appropriately sized soil cracks, tree cavities, and debris.

AWS-8 Clearance Surveys: No more than 24 hours prior to the date of initial ground disturbance and vegetation clearing, a SFWO-approved biologist with experience in the identification of the Alameda whipsnake will conduct clearance surveys and monitoring within 50 feet of the project site. The SFWO-approved biologist will investigate all areas that could be used by Alameda whipsnakes for sheltering, movement, and other essential behaviors. This includes an adequate examination of rock outcroppings and mammal burrows. Safety permitting, the SFWO-approved biologist will investigate areas of disturbed soil for signs of the listed species within 30 minutes following the initial disturbance of that given area. The SFWO-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 Alameda whipsnake.

AWS-9 Entrapment Prevention: To prevent inadvertent entrapment of Alameda whipsnakes during construction excavated holes or trenches more than one foot deep with walls steeper than 30 degrees will be covered at the close of each working day by plywood or similar materials. Alternatively, an additional 4-foot high vertical barrier, independent of exclusionary fences, will be used to further prevent the inadvertent entrapment of listed species. If it is not feasible to cover an excavation or provide an additional 4-foot high vertical barrier, independent of exclusionary fences, one or more escape ramps constructed of earth fill or wooden planks will be installed. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals. If at any time a trapped Alameda whipsnake is discovered, the onsite biologist will immediately place escape ramps or other appropriate structures to allow the animal to escape or the Service will be contacted by telephone for guidance. The SFWO will be notified of the incident by telephone and e-mail within 24 hours.

AWS-10 Wildlife Exclusion Fencing: Prior to the start of construction in individual construction areas, wildlife exclusion fencing will be installed along the project footprint in all areas where the Alameda whipsnake could enter the active site. The location and extent of wildlife exclusion fencing will be presented to the SFWO for approval prior to project initiation. The Subapplicant will include the exclusion fencing specifications on the final project plans. The Subapplicant will include the exclusion fencing specifications, including installation and maintenance criteria, in the bid solicitation package special provisions. The fencing will remain in place throughout the duration of the construction activities within the individual work areas and will be regularly inspected and fully maintained. Repairs to the fence will be made within 24 hours of discovery. Upon completion of activities within the given area, the fence will be completely removed; the area cleaned of debris and trash, and returned to natural conditions.

AWS-11 Fencing: Prior to ground disturbance, active areas within the project footprint will be delineated with temporary, high-visibility fencing to prevent the encroachment of construction personnel and equipment outside the described project footprint. The fencing will be removed after all construction equipment is removed from those segments of the project.

AWS-12 Using Cover Boards: The SFWO-approved biologist will place cover boards in strategic locations throughout the project footprint during the pre-construction surveys. During construction, these cover boards will be checked on a daily basis for the Alameda whipsnake when the SFWO-approved biologist is onsite.

AWS-13 Reporting: The SFWO will be notified within one (1) working day if an Alameda whipsnake is discovered within the Action Area. The Resident Engineer or Project Manager will immediately contact the SFWO-approved biologist in the event that an Alameda whipsnake is observed within a construction zone. The Resident Engineer will suspend construction activities within a 50-foot radius of the animal until the animal leaves the site voluntarily or as a last option, the animal is captured and relocated according to SFWO-approved protocol.

AWS-14 Suitable Erosion Control Materials: Plastic monofilament netting (erosion control matting) or similar material will be prohibited from use on the project because the Alameda whipsnake may become entangled or trapped in it. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.

AWS-15 Limitation on Rodenticide Use: No rodenticides will be used at the project site during construction in areas that support suitable habitat for the Alameda whipsnake

AWS-16 Encounters with Species: Each Alameda whipsnake encounter will be treated on a case-by-case basis in coordination with the SFWO but general guidance is as follows: (1) leave the non-injured animal if it is not in danger; or, (2) move the animal to a nearby location if it is in danger. These options are further described as follows:

a. When an Alameda whipsnake is encountered in the Action Area the first priority is to stop all activities in the surrounding area that have the potential to result in the harm, injury, or death of the individual. The monitor then needs to assess the situation in order to select the course of action that will minimize adverse effects to the individual. Contact the SFWO once the site is secure. Contact the SFWO again prior to the start of construction to confirm the animal's status.
b. The first priority is to avoid contact with the animal and allow it to move out of the project footprint and hazardous situation on its own to a safe location. The animal will not be

picked up and moved because it is not moving fast enough or it is inconvenient for the construction schedule. This guidance only applies to situations where an animal is encountered while moving under conditions that make their upland travel feasible. This does not apply to animals that are uncovered or otherwise exposed or in areas where there is not sufficient adjacent habitat to support the life history of the Alameda whipsnake if they move outside the construction footprint.

c. Avoidance is the preferred option if the animal is not moving or is within some sort of burrow or other refugia. In this case, the area will be well marked for avoidance by construction and a SFWO-approved biological monitor will be assigned to the area when work is taking place nearby.
d. The animal will be captured and moved when it is the only option to prevent its death or injury.
e. If appropriate habitat is located immediately adjacent to the capture location then the preferred option is short distance relocation to that habitat. This must be coordinated with the SFWO, but the general guidance is the snake will not be moved outside of the area where it could have traveled on its own. Captured snakes will be released in appropriate cover as close to their capture location as possible for their continued safety. Under no circumstances will an animal be relocated to another property without the owner's written permission. It is the Subapplicant's responsibility to arrange for that permission.
f. The release must be coordinated with the SFWO and will depend on where the individual was found and the opportunities for nearby release. In most situations the release location is likely to be into the mouth of a small burrow or other suitable refugia.
g. Only SFWO-approved biologists for the project can capture Alameda whipsnakes.

Valley Elderberry Longhorn Beetle Conservation Measures

In general terms, the *May 2017 Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle* (VELB) will be followed. Below is a summary of some of the key measures to implement on Subapplicant's proposed projects that may affect VELB. If elderberry shrubs occur on or within 50 meters (165 feet) of the Action Area, adverse effects to VELB may occur as a result of project implementation. If the project may affect VELB or its habitat, appropriate avoidance and minimization measures are recommended. Not all measures may be appropriate for every project, and Subapplicants will implement the measures that are identified in the ESA Review Form for a specific project. FEMA will submit to the SFWO the completed ESA Review Form for projects that are covered under this programmatic biological opinion, outlining the applicable measures to protect VELB. This text is intended to provide language that may be used by the Subapplicants to describe avoidance and minimization measures for their proposed project.

VELB-1 Fencing: All areas to be avoided during construction activities will be fenced and/or flagged as close to construction limits as feasible.

VELB-2 Avoidance Area: Activities that may damage or kill an elderberry shrub (e.g., trenching, paving, etc.) may need an avoidance area of at least 6 meters (20 feet) from the drip-line, depending on the type of activity.

VELB-3 Worker Education: A SFWO-approved biologist will provide training for all contractors, work crews, and any onsite personnel on the status of the VELB, its host plant and habitat, the need to avoid damaging the elderberry shrubs, and the possible penalties for non-compliance.

VELB-4 Biological Monitor: A SFWO-approved biologist will monitor the work area at project-appropriate intervals to assure that all avoidance and minimization measures are implemented. The amount and duration of monitoring will depend on the project specifics and the contractor will discuss it with the SFWO-approved biologist.

VELB-5 Seasonal Avoidance: As much as feasible, all activities that could occur within 50 meters (165 feet) of an elderberry shrub will be conducted between August and February, outside of the flight season of the VELB, which occurs from March to July, coinciding with the bloom period of the elderberry plant.

VELB-6 Trimming: Trimming may remove or destroy VELB eggs or larvae and may reduce the health and vigor of the elderberry shrub. In order to avoid and minimize adverse effects to VELB when trimming, trimming will occur between November and February and will avoid the removal of any branches or stems that are ≥ 1 inch in diameter. Measures to address regular or large-scale maintenance (trimming) will be established in consultation with the SFWO.

VELB-7 Limitations on Chemical Use: Herbicides will not be used within the drip-line of the shrub. Insecticides will not be used within 30 meters (98 feet) of an elderberry shrub. All chemicals will be applied using a backpack sprayer or similar direct application method.

VELB-8 Mowing: Mechanical weed removal within the drip-line of the shrub will be limited to the season when adults are not active (August - February) and will avoid damaging the elderberry.

VELB-9 Erosion Control and Revegetation: Erosion control will be implemented and the affected area will be revegetated with appropriate native plants.

VELB-10 Transplanting: In order to protect VELB larvae to the greatest extent possible, we recommend that all elderberry shrubs with stems greater than 1 inch in diameter be transplanted under the following conditions:

a. If the elderberry shrub cannot be avoided.
b. If indirect effects will result in the death of stems or the entire shrub.

Removal of entire elderberry plants without disturbance to the surrounding habitat is uncommon, but may occur on certain projects. The removal may either include the roots or just the removal of the aboveground portion of the plant. The SFWO encourages project applicants to attempt to remove the entire root ball and transplant the shrub, if possible. In order to minimize the fragmentation of VELB habitat, the SFWO encourages applicants to relocate elderberry shrubs as close as possible to their original location. Elderberry shrubs may be relocated adjacent to the project footprint if: 1) the planting location is suitable for elderberry growth and reproduction; and 2) the project proponent is able to protect the shrub and ensure that the shrub becomes reestablished. If these criteria cannot be met, the shrub may be transplanted to an appropriate SFWO-approved mitigation site. Any elderberry shrub that is unlikely to survive transplanting because of poor condition or location, or a shrub that will be extremely difficult to move because of access problems, may not be appropriate for transplanting. The following transplanting guidelines may be used by agencies/applicants in developing their VELB conservation measures:

Monitor**.** A SFWO-approved biologist will be onsite for the duration of transplanting activities to assure compliance with avoidance and minimization measures and other conservation measures.

Exit Holes. Exit-hole surveys will be completed immediately before transplanting. The number of exit holes found, GPS location of the plant to be relocated, and the GPS location of where the plant is transplanted will be reported to the Service and to the California Natural Diversity Database (CNDDB).
Timing. Elderberry shrubs will be transplanted when the shrubs are dormant (November through the first two weeks in February) and after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the shrub and increase transplantation success.
Transplanting Procedure. Transplanting will follow the most current version of the ANSI A300 (Part 6) guidelines for transplanting (http://www.tcia.org/).
Trimming Procedure. Trimming will occur between November and February and will minimize the removal of branches or stems that exceed 1 inch in diameter.

VELB-11 Impacts to Individual Shrubs: In certain instances, impacts to elderberry shrubs, but not the surrounding habitat may occur. This could take the form of trimming or complete removal of the plant. Trimming elderberry shrubs may result in injury or death of eggs, larva, or adults depending on the timing and extent of the trimming. Since the larva feed on the elderberry pith while they are developing, any trimming that may affect the health of the plant and cause the loss of stems may kill any larva in those stems. No adverse impacts to the VELB will occur if trimming does not remove stems/branches that are ≥1 inch in diameter and is conducted between November and February. Trimming that occurs outside of this window or removes branches ≥ 1 inch in diameter may result in adverse effects to VELB. In order to assess the risk of take from trimming activities, we recommend the following be evaluated:

a. Conduct an exit hole survey on the plant.
b. Evaluate the surrounding habitat (riparian vs. non-riparian).
c. Evaluate the potential suitability of the plant to provide VELB habitat.
    i. Riparian plants are much more likely to be occupied or colonized by VELB.
    ii. Plants in non-riparian locations will be evaluated using the criteria in Figure 2.

VELB-12 Other Activities: The SFWO's Framework for VELB may not be applicable for restoration, floodway maintenance, and other large scale habitat modification activities. These activities and the potential effects to VELB and its habitat will be considered on a project-by-project basis and discussed with the SFWO. The SFWO recommends that project proponents consider the effects to the species on a landscape level and ultimately seek to protect, preserve, and restore the continuity of VELB habitat. These and similar activities that may adversely impact the VELB and its habitat at landscape scales will consider avoidance and minimization strategies that are appropriate for the specific project. Some possible conservation measures to consider for these large-scale projects include:

a. Transplanting all affected elderberries to a similar onsite location.
b. Maintaining patches of appropriate habitat in areas where large-scale removal of elderberry shrubs will occur.
c. Scale trimming, removal, and other activities that allow VELB to persist within the area.

California Freshwater Shrimp Conservation Measures

CAFS-1 Biological Monitor: A SFWO-approved biologist will conduct surveys of suitable habitat within the Action Area for presence of the California freshwater shrimp in the work area 24 hours prior to any vegetative clearing work, dewatering, or ground disturbing activities.

CAFS-2 Species Observations and Handling Protocol: If California freshwater shrimp are present in the Action Area the following procedures will be used:

a. Prior to any California freshwater shrimp handle/capture activities, the SFWO will be contacted to identify relocations sites and options appropriate for the species in the location of the project activity.
b. California freshwater shrimp will be captured by hand-held nets [e.g., heavy-duty aquatic dip nets (12" D-frame net) or small minnow dip nets] and relocated out of the work area in the net or placed in buckets containing stream water and then moved directly to the nearest suitable habitat in the same branch of the creek. Suitable habitat will be identified prior to capturing California freshwater shrimp to minimize holding time. Suitable habitat is defined as creek sections that will remain wet over the summer and where banks are structurally diverse with undercut banks, exposed fine root systems, overhanging woody debris, or overhanging vegetation. No California freshwater shrimp will be placed in buckets containing other aquatic species.
c. Once the SFWO-approved biologist has determined that all shrimp have been effectively relocated, barrier seines or exclusion fencing no greater than 5 mm will be installed to prevent shrimp from moving back in, as appropriate.
d. Only SFWO-approved biologists will participate in the capture, handling, and monitoring of California freshwater shrimp. The SFWO-approved biologist will report the number of captures, releases, injuries, and mortalities to the Service within 30 days of project completion. If take exceeds the levels anticipated in this programmatic biological opinion, work will stop immediately and the SFWO will be notified within one working day.

CAFS-3 Seasonal Avoidance: No work during wet weather or where saturated ground conditions exist; if a 60% chance of a one half inch of rain or more within a 24-hour period is forecasted, then operations will cease until 24 hours after rain has ceased.

CAFS-4 Habitat Protection: Habitat for this species will be protected, as follows:

a. No large woody debris (LWD) will be removed in active (wetted) channels. Trees may be removed for access routes for construction equipment. If trees need to be removed from other portions of the project site, willows over 3 inches in diameter at breast height will not be removed and there will be no reduction in canopy cover provided by hardwoods or conifers.
b. Disturbance and removal of aquatic vegetation will be minimized to the extent practicable. Downed trees, stumps and other basking sites and refuges within these aquatic habitats will remain undisturbed as much as possible.

CAFS-5 Revegetation: The stream bank will be planted with species which will enhance the year-round habitat value of the stream edge by providing adequate shelter, stability, complexity and food production potential for California freshwater shrimp. The revegetation will include plantings such as widely spaced trees, willow sprigs, and sedges near the water's edge, plantings of herbaceous plant species to fill in gaps and therefore augment existing habitat.

CAFS-6 Site Restrictions: New access routes requiring tree removal and grading will be limited to no more than two. Access routes will not be along the top of the stream bank but relatively perpendicular (45 to 90 degrees is acceptable) to the bank.

CAFS-7 Site Access: Where available, access to the work area will use existing ingress or egress points, or work will be performed from the top of the stream banks.

CAFS-8 Erosion Control: Any disturbed ground must receive appropriate erosion control treatment (mulching, seeding, planting, etc.) prior to the end of the construction season, prior to ceasing operations due to forecasted wet weather, and within seven days of project completion. Operations will use all feasible techniques to prevent any sediment from entering a drainage system.

CAFS-9 Suitable Erosion Control Materials: Erosion control materials will not include plastic mono-filament netting or similar materials in which animals might become entangled.

CAFS-10 Cleanup After Construction: Work pads, falsework, and other construction items will be removed from the 100 year floodplain by the end of the construction window.

CAFS-11 Construction Design: Prior to removal of an existing structure, a debris catching platform will be constructed under the structure.

CAFS-12 Waste Management: Trash will be properly contained, removed from the work areas, and disposed of regularly. Following construction, all trash and construction debris will be removed from the Project footprint.

CAFS-13 Fueling Restrictions: Fueling and maintenance of vehicles and equipment will occur at least 50 feet from any riparian or aquatic habitat. Prior to the start of construction a plan will be prepared to ensure a 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 take if a spill occurs.

Multiple Butterfly Species Conservation Measures

Butterfly Species	Bloom/Flight Season	Host Plants
Bay Checkerspot Butterfly	February - early May	California plantain (*Plantago erecta*), purple owl's clover (*Castilleja densiflora*) and exserted paintbrush (*C. exserta*)
Callipe Silverspot Butterfly	mid-May - late July	Johnny jump-up (*Viola pedunculata*)
Mission Blue Butterfly	Late March - early July	Three lupine species (*Lupinus albifrons, L. formosus;* and *L. varicolor*)
Myrtle's silverspot butterfly	mid-June - early October	western dog violet (*Viola aduca*)
San Bruno elfin	Late February - mid-April	Stone crop (*Sedum spathulifolium)*

LEP-1 Pre-construction Surveys: The Subapplicant will implement the following measure depending on the time of year for project construction:

a. During the non-flight season, pre-construction surveys for caterpillars and the larval host plants will be conducted during the typical bloom season. A SFWO-approved biologist, able to identify the larval host plants and caterpillars of the listed butterfly species, will conduct up to three surveys prior to the start of construction to determine the use of the site by the listed butterflies.

b. During the flight season, pre-construction surveys for butterflies and the larval host plants will be conducted. A SFWO-approved biologist, able to identify the butterflies and their host plants, will conduct up to three surveys prior to the start of construction to determine the use of the site by the listed butterflies. If flight surveys are not possible, then the butterfly species associated with the larval host plant will be assumed present.

LEP-2 Biological Monitor: During the adult flight season of listed butterfly species, a SFWO-approved biologist will be present when construction activities occur in or within 100 feet of suitable habitat (dispersal habitat as well as areas containing the larval host plant and adult food plants). If one or more adult listed butterflies are observed in the work area, work activities will temporarily cease unless the SFWO-approved biologist determines that work activities will not directly affect the individual(s).

LEP-3 Fencing: Any larval food plants found within 300 feet of the project footprint will be clearly marked and will be avoided to the maximum extent practicable. Orange fencing/flagging will be placed along the edge of the work area near any larval food plants to prevent workers and vehicles from entering this area. Fencing/flagging will be installed prior to any ground disturbing or vegetation removal activities. A SFWO-approved biologist will supervise the installation of flagging or fencing around stands of known listed butterfly host/food plants. The fencing/flagging will be placed the maximum distance from the plants possible (up to 100 feet), while still allowing work to occur in the adjacent area. The location of the flagging/fencing will be field-adjusted by the SFWO-approved biologist as necessary. The temporary fencing/flagging will be furnished, constructed, maintained, and later removed and specified in the construction bid documents. Temporary fencing/flagging will be at least 4-foot-high and constructed of high visibility material (e.g., orange, commercial- quality woven polypropylene or similar material). No construction activities will be permitted within the fenced/flagged area. Warning signs indicating the sensitivity of the area will be attached to the fencing/flagging.

LEP-4 Monitoring Log: Each day the SFWO-approved biologist will monitor for listed butterflies, inspect the fencing/flagging and immediately notify the resident engineer (or their designated contact) to address any necessary fencing/flagging repairs. A biological monitoring log of construction site conditions and observations will be maintained and kept on file.

LEP-5 Dust Control: The SFWO-approved biologist will ensure that dust is controlled during construction by periodically watering down construction areas within 100 feet of listed butterfly habitat as necessary. Watering down the construction area will prevent dirt from becoming air borne and accumulating on larval host plants and adult food source plants for listed butterflies.

Conservation Measures for Vernal Pool Fairy Shrimp, Conservancy Fairy Shrimp, Longhorn Fairy Shrimp, Vernal Pool Tadpole Shrimp

To avoid and minimize adverse effects to the vernal pool branchiopods, the measures listed below will be implemented in the project footprint where suitable listed branchiopod habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur.

VPBR-1 Pre-construction Surveys: If possible, prior to construction activities, the SFWO-approved biologist will conduct pre-construction, reconnaissance surveys in seasonally inundated habitats (seasonal wetland, non-inundated wetlands) within the project footprint. The SFWO-approved biologist will conduct general aquatic surveys at a suitable interval after the first significant storm event of the rainy season (October 15 to June 1), prior to construction activities. The surveys will include a habitat assessment of the hydrological, biological, and ecological conditions of each seasonal wetland and open waters. The habitat assessment will provide information regarding the quality and suitability of seasonal wetlands for the vernal pool branchiopods covered under this programmatic biological opinion (vernal pool fairy shrimp, Conservancy fairy shrimp, longhorn fairy shrimp, and vernal pool tadpole shrimp). If any vernal pool branchiopods are found during the surveys, the SFWO-approved biologist will submit a report to the SFWO within 1 month of completing the field work. The report will provide results of all surveys, a summary of all the data collected, and the habitat assessment. If surveys are not possible, then listed vernal pool branchiopod species presence will be assumed on all suitable habitat within the Action Area.

VPBR-2 Biological Monitor: A SFWO-approved biologist will monitor all construction activities within 250 feet of suitable habitat for listed vernal pool branchiopods to ensure that no unnecessary take or destruction of habitat occurs.

VPBR-3 Exclusion Areas: Non-disturbance exclusion zones will be established, maintained, and monitored by a SFWO-approved biological monitor to ensure that take of vernal pool branchiopods or destruction of their habitat does not occur outside of the project footprint, in areas where suitable habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur. A buffer of at least 250 feet from any vernal pool, vernal pool grassland, or seasonal wetland will be established for the following:

a. Staging areas of all equipment for storage, fueling, and maintenance with hazardous material absorbent pads available in the event of a spill; and
b. Mixing of pesticides, herbicides, or other potentially toxic chemicals.

VPBR-4 Seasonal Avoidance: Work within 250 feet of suitable listed vernal pool branchiopod habitat (e.g., vernal pools, seasonal wetlands) will be performed between June 1 and October 15 under dry site conditions to the maximum extent possible to minimize adverse impacts to aquatic habitats.

VPBR-5 Work Restrictions During Dry Season: A SFWO-approved biologist will flag or monitor all operations and maintenance work during the *dry season* (generally June 1 to October 15) within 250 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:

a. hand-held herbicide application is prohibited within the pool or at the edge of the pool;
b. power spray herbicide application is prohibited within 100 feet of the edge of the pool;
c. broadcast herbicide application is prohibited within 150 feet of the edge of the pool; and
d. ground-disturbing activities are prohibited within 25 feet of the edge of the pool.

VPBR-6 Work Restrictions During Wet Season: If any construction activities remain and must occur during the October 15 - June 1 *wet period*, exclusion fencing and erosion control materials will be placed around the vernal pools and other seasonal wetlands as determined by the SFWO-approved biologist to reduce sedimentation into vernal pool habitat. The fencing will provide a buffer between construction activities and the vernal pools and other seasonal wetlands. The SFWO-approved biologist will erect and maintain the exclusion fencing.

VPBR-7 Erosion Control: Any vernal pool, vernal pool grassland, or seasonal wetland will be protected from siltation and contaminant runoff by use of erosion control. Erosion-control measures will be placed between the outer edge of the buffer and the activity area.

VPBR-8 Suitable Erosion Control Materials: Erosion-control materials will be of a tightly woven natural fiber netting or similar material that will not entrap reptiles and amphibians (e.g., coconut coir matting). No micro-filament netting will be used. All fiber rolls and hay bales used for erosion control will be certified as free of noxious weed seed.

VPBR-9 Dust Control: Dust control measures will be implemented to prevent the transport of soil from exposed surfaces to vernal pool, swale, and rock pool habitat. Sprinkling with water will not be done in excess to minimize the potential for non-storm water discharge.

VPBR-10 Monitoring During Wet Season: A SFWO-approved biologist will flag or monitor all operations and maintenance work during the *wet season* (generally October 1 to June 1) within 150 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:

a. Hand-held herbicide application is prohibited within 25 feet of the edge of the pool;
b. Power spray herbicide application is prohibited within 100 feet of the edge of the pool;
c. Broadcast herbicide application is prohibited within 150 feet of the edge of the pool;
d. Manual clearing of vegetation is prohibited at the pool or beyond the edge of the pool;
e. Mechanical clearing of vegetation is prohibited within 100 feet of the edge of the pool; and
f. Ground-disturbing activities are prohibited within 50 feet of the edge of the pool.

VPBR-11 Vehicle Maintenance: Vehicles will be inspected daily for fluid leaks before leaving a staging area.

VPBR-12 Site Restrictions: Routine maintenance activities within 250 feet of vernal pool and swale habitat will be avoided to the maximum extent possible.

VPBR-13 Use of Native Plants for Revegetation: When revegetating upland areas to pre-project condition, native plants will be used to the maximum extent practicable.

VPBR-14 Invasive Plant Species Prevention: To minimize the introduction of invasive plant species, construction vehicles will be cleaned prior to any work within 150 feet of vernal pool branchiopod habitat.

Conservation Measures for Vernal Pool Listed Plants

These measures apply to the following 19 listed vernal pool plant species: Burke's goldfields (*Lasthenia burkei*), Butte County meadowfoam (*Limnanthes floccosa ssp. californica*), Calistoga allocarya (*Plagiobothrys strictus*), Colusa grass (*Neostapfia colusana*), Contra Costa goldfields (*Lasthenia conjugens*), few-flowered navarretia (*Navarretia leucocephala ssp. pauciflora [=N. pauciflora*]), fleshy owl's-clover (*Castilleja campestris ssp. succulenta*), Greene's tuctoria (*Tuctoria greenei*), hairy Orcutt grass (*Orcuttia pilosa*), Hoover's spurge (*Chamaesyce hooveri [=Euphorbia hooveri*]), Lake County stonecrop (*Parvisedum leiocarpum [=Sedella leiocarpa*]), Loch Lomond coyote thistle (*Eryngium constancei*), many-flowered navarretia (*Navarretia leucocephala ssp. plieantha*), Sacramento Orcutt grass (*Orcuttia viscida*), San Joaquin Orcutt grass (*Orcuttia inaequalis*), Sebastopol meadowfoam (*Limnanthes vinculans*), Slender Orcutt grass (*Orcuttia tenuis*), Solano grass (*Tuctoria mucronata*), and Sonoma sunshine (*Blennosperma bakeri*).

To avoid and minimize adverse effects to the vernal pool plants, the measures listed below will be implemented in the project footprint where suitable vernal pool habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur.

VP PLANT-1 Pre-construction Surveys: If possible, prior to construction activities, the SFWO-approved biologist will conduct protocol-level bloom-season plant surveys in seasonally inundated habitats (seasonal wetland, non-inundated wetlands) within the project footprint. If any listed vernal pool plant species are found during the surveys, the SFWO-approved biologist will submit a report to the SFWO within 1 month of completing the field work. The report will provide results of all surveys, a summary of all the data collected, and the habitat assessment. Information regarding the location of listed plant populations will be provided to CDFW's California Natural Diversity Database (CNNDB) according to their reporting protocols. If surveys are not possible, then listed vernal pool species presence will be assumed on all suitable habitats within the Action Area.

VP PLANT-2 Flagging: Flagging or other field markers identifying the plants, or in the event protocol-level surveys were not conducted – the suitable habitat, will be placed prior to each work event and removed after that work event is completed for all phases of the proposed project.

VP PLANT-3 Biological Monitor: A SFWO-approved biologist will monitor all construction activities within 250 feet of suitable habitat for listed vernal pool plants to ensure that no unnecessary loss or destruction of habitat occurs.

VP PLANT-4 Exclusion Areas: A SFWO-approved biologist will delineate a 50-foot avoidance buffer around all federally-listed plants or their suitable habitat. The non-disturbance exclusion zones will be established, maintained and monitored by a SFWO-approved biological monitor to ensure that loss of listed vernal pool plants or destruction of their habitat does not occur outside of the project footprint where suitable habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur. In addition, a buffer of at least 250 feet from any vernal pool, vernal pool grassland, or seasonal wetland will be established for the following:

a. Staging areas of all equipment for storage, fueling, and maintenance with hazardous material absorbent pads available in the event of a spill; and
b. Mixing of pesticides, herbicides, or other toxic chemicals.

VP PLANT-5 Seasonal Avoidance: Work within 250 feet of suitable listed vernal pool plant habitat (e.g., vernal pools, seasonal wetlands) will be performed between June 1 and October 15 under dry site conditions to the maximum extent possible to minimize adverse impacts to aquatic habitats.

VP PLANT-6 Work Restrictions During Dry Season: A SFWO-approved biologist will flag or monitor all operations and maintenance work during the *dry season* (generally June 1 to October 15) within 250 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:

a. Hand-held herbicide application is prohibited within the pool or at the edge of the pool;
b. Power spray herbicide application is prohibited within 100 feet of the edge of the pool;
c. Broadcast herbicide application is prohibited within 150 feet of the edge of the pool; and
d. Ground-disturbing activities are prohibited within 25 feet of the edge of the pool.

VP PLANT-7 Work Restrictions During Wet Season: If any construction activities remain and must occur during the October 15 - June 1 *wet period*, exclusion fencing and erosion control materials will be placed around the vernal pools and other seasonal wetlands as determined by the SFWO-approved biologist to reduce sedimentation into vernal pool habitat. The fencing will provide a buffer between construction activities and the vernal pools and other seasonal wetlands. The SFWO-approved biologist will erect and maintain the exclusion fencing.

VP PLANT-8 Erosion Control: Any vernal pool, vernal pool grassland, or seasonal wetland will be protected from siltation and contaminant runoff by use of erosion control. Erosion-control measures will be placed between the outer edge of the buffer and the activity area.

VP PLANT-9 Suitable Erosion Control Materials: Erosion-control materials will be of a tightly woven natural fiber netting or similar material that will not entrap reptiles and amphibians (e.g., coconut coir matting). No micro-filament netting will be used. All fiber rolls and hay bales used for erosion control will be certified as free of noxious weed seed.

VP PLANT-10 Dust Control: Dust control measures will be implemented to prevent the transport of soil from exposed surfaces to vernal pool, swale, and rock pool habitat. Sprinkling with water will not be done in excess to minimize the potential for non-storm water discharge.

VP PLANT-11 Monitoring During Wet Season: A SFWO-approved biologist will flag or monitor all operations and maintenance work during the *wet season* (generally October 1 to June 1) within 150 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:

a. Hand-held herbicide application is prohibited within 25 feet of the edge of the pool;
b. Power spray herbicide application is prohibited within 100 feet of the edge of the pool;
c. Broadcast herbicide application is prohibited within 150 feet of the edge of the pool;
d. Manual clearing of vegetation is prohibited at the pool or beyond the edge;
e. Mechanical clearing of vegetation is prohibited within 100 feet of the edge of the pool; and
f. Ground-disturbing activities are prohibited within 50 feet of the edge of the pool.

VP PLANT-12 Vehicle Maintenance: Vehicles will be inspected daily for fluid leaks before leaving a staging area.

VP PLANT-13 Site Restrictions: Routine maintenance activities within 250 feet of vernal pool and swale habitat will be avoided to the maximum extent possible.

VP PLANT-14 Use of Native Plants for Revegetation: When revegetating upland areas to pre-project condition, native plants will be used to the maximum extent practicable.

VP PLANT-15 Invasive Plant Species Prevention: To minimize the introduction of invasive plant species, construction vehicles will be cleaned prior to entering any vernal pool habitat.

Tidewater Goby Conservation Measures

TIGO-1 Installation of In-water Nets: Prior to initiation of dewatering or sediment removal work, a Service-approved 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.

TIGO-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.

TIGO-3 Capture and Relocation: Once the block nets are secured, a Service-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. 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.

TIGO-4 Flagging: 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.

TIGO-5 Erosion 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.

TIGO-6 Biological Monitor: A Service-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.

TIGO-7 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).

TIGO-8 Hydrology and Topography Protection: Project activities will avoid creation of berms and dykes, steepening of channel slopes, placement of rock slope protection, and other actions that could result in alteration of hydrology, changes to water surface elevation levels, increased flooding, changes to flow velocities, and increased scour within tidewater goby designated critical habitat. However, the in-kind replacement of existing or damaged rock slope protection may occur.

TIGO-9 Limits on Habitat Disturbance: Project activities will not result in permanent loss of tidewater goby designated critical habitat unless the impacts to habitat are determined to be insignificant via project-level consultation (i.e., small permanent impacts that will have a negligible effect on habitat quality for tidewater goby).

Southwestern Willow Flycatcher

SWWF-1 Habitat Assessment: A habitat assessment will be conducted by a Service-approved biologist to determine whether suitable habitat (including foraging, nesting, and dispersal) for the flycatcher 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 flycatcher, the Service will be contacted regarding the need for surveys according to Service protocol and those surveys will be conducted, as appropriate. Otherwise, if the Service agrees based on other biological data or reasoning, the species will be determined present in areas with suitable habitat.

SWWF-2 Habitat Buffer: If project activities are conducted during the breeding season (i.e., May 1-September 1), a 500-foot disturbance-free buffer will be established and demarcated by fencing or flagging around occupied habitat. This buffer may be adjusted provided noise levels do not exceed 60 dBA at the edge of the nest site. If the noise meets or exceeds the 60 dBA threshold, or if the biologist determines that the construction activities are disturbing nesting activities, the biologist will have the authority to halt the construction and will devise methods to reduce the noise and/or disturbance in the vicinity.

SWWF-3 No Permanent or Temporary Loss of Habitat: No permanent or temporary loss of flycatcher occupied or designated critical habitat will occur (within or outside of the breeding season).

Least Bell's Vireo Conservation Measures

LBV-1 Habitat Assessment: A habitat assessment will be conducted by a biologist to determine whether suitable habitat (including foraging, nesting, and dispersal) for the least Bell's vireo 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 least Bell's vireo, the Service will be contacted regarding the need for surveys according to Service protocol and those surveys will be conducted, as appropriate. With Service concurrence, FEMA may also forgo surveys by making a determination that suitable habitat is occupied for the purposes of section 7 consultation.

LBV-2 Seasonal Avoidance: To minimize direct effects to nesting least Bell's vireos, all clearing of vegetation within occupied habitat will occur outside the breeding season (i.e., March 15-September 15) to the maximum extent practicable. If the breeding season cannot be avoided, a Service-approved biologist will conduct preconstruction nesting bird surveys, at least 48 hours before and no more than 1 week prior to vegetation removal. If no active nests are found to occur within 300 feet of the Action Area, project activities may proceed.

LBV-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 Service-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. A biologist will monitor the nest during construction for signs of adverse effects including

distress/disturbance (unless "take" is authorized). If adverse effects are detected then the Service-approved biologist will have the authority to stop all construction activating in the vicinity of the nest and will coordinate with the Service to determine whether additional conservation measures will avoid or minimize effects on the nesting birds. Construction may resume only with approval from the Service. AND

c. If construction must occur within the buffer and exclusion zones or otherwise may cause adverse effects on the least Bell's vireo, then take may be authorized and disturbance may occur (as covered under this programmatic biological opinion). Unanticipated adverse effects on the least Bell's vireo will require reinitiation of consultation.

LBV-4 Habitat Avoidance: Staging and temporary construction areas will be located outside of suitable habitat and will utilize existing roads and developed areas to the extent possible. All mature riparian vegetation (e.g., willows and cottonwoods), that are greater than 30 feet in height, will be avoided to the maximum extent possible. If mature riparian vegetation cannot be avoided, it will be either transplanted elsewhere within or near the Action Area or placed horizontally or diagonally outside the project footprint under the direction of a Service-approved biologist.

LBV-5 Habitat Restoration Plan: Prior to construction, prepare a Restoration Plan will be prepared that describes the efforts to restore all the areas of suitable habitat for the least Bell's vireo that were temporarily impacted. The Restoration Plan will be reviewed and approved by the Service.

LBV-6 Limits on Habitat Disturbance: For any specific project, temporary impacts on occupied or designated critical habitat by the least Bell's vireo 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 least Bell's vireo occupied or designated critical habitat. In addition, impacts will be limited to 10 territories.

LBV-7 No Permanent Loss of Habitat: No permanent loss of occupied or designated critical habitat for the least Bell's vireo will occur unless the impact to habitat are determined to be insignificant via project-level consultation (i.e., small permanent impacts that will have negligible effect on habitat quality for the least Bell's vireo).

California Least Tern Conservation Measures

CLT-1 Seasonal Avoidance: To avoid the nesting season of the California least tern, project activity in occupied habitat will be allowed from September 30-March 31. Occupied habitat for this species is well documented online. If project activities occur during the nesting season, they will occur at least 800 feet away from California least tern occupied habitat, and noise within occupied habitat will be monitored to ensure that it does not exceed 60 dBA hourly.

CLT-2 Biological Monitor: A Service-approved biologist will monitor all construction activities within occupied habitat to ensure that no take of the species or destruction of occupied habitat occurs. The Service-approved biologist will have stop work authority if adverse effects of nesting California least terns are observed.

CLT-3 Use of Handheld Tools: Non-breeding season project activity in occupied habitat will be limited to the use of handheld tools, including handheld motorized implements such as chain saws and power augers. Tools will be washed prior to use in these habitats to reduce the spread of non-native and invasive plant species and their seeds. No heavy equipment will be allowed within suitable nesting habitats. If handheld motorized tools are used, operators will employ best management practices to avoid and minimize soil and water contamination from fuel and lubricants. Measures include: a) use spill-resistant fuel and lubricant containers; b) use a portable containment pad for re-fueling in the field; c) immediately report petroleum spills to the landowner, or land management agency, and notify appropriate local authorities for advice and action on containment and cleanup of spills; and d) clearly mark the location and/or boundaries of the spill site to enable rapid remedial action.

CLT-4 Habitat Protection: No soil stabilization materials or offsite materials (e.g., decomposed granite, soil, rocks, etc.) will be added to the surface within occupied habitat. No excavation or grading will be allowed within occupied habitat either.
CLT-5 Flagging: When necessary to minimize the area affected by the project, work site boundaries will be marked with flagging or other visible materials, which will be removed at the conclusion of the project.

CLT-6 Avoid Placement of Predator Perches: Workers will avoid temporary or permanent placement of structures (e.g., posts, railings, tall equipment, or fence lines) that could provide elevated perches for predatory birds near or within occupied habitat.

CLT-7 Access Restrictions: Access to work sites in occupied habitat will be by foot travel only. Motorized vehicles, including all-terrain vehicles, will not be used in occupied habitat.

CLT-8 Restoration of Work Areas: At the conclusion of the project, areas temporarily affected by project activity will be restored to their pre-project condition (for example, footpaths will be raked to their original ground contour and native vegetation will be reestablished, if necessary).

CLT-9 Waste Management: Trash, food, food containers, and food waste will be secured at all times by individual workers, or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.

Marbled Murrelet Conservation Measures

MAMU-1 Work Restrictions in Occupied Habitat: If marbled murrelet surveys (using the 2003 Service survey protocol; Evans Mack *et al.* 2003) determine that the Action Area is occupied **or** if FEMA or the Service presumes marbled murrelet occupancy without conducting surveys, the project Subapplicant will adhere to the following Conservation Measures. Surveyors are required to meet or exceed all training recommendations in Evans Mack et al. (2003), and be registered as qualified surveyors on a current Service 10(a)(1)(A) Recovery Permit.

a. Vegetation Removal or Alteration of Known or Potential Nest Trees:

    i. No potential marbled murrelet nest trees will be removed during nesting season (24 March to 15 September). Potential habitat defined as: (1) mature (with or without an old-growth component) and old-growth coniferous forests; and (2) younger coniferous forests that have platforms (relatively flat, at least 4-inch diameter and at least 33 feet above the base of the live crown of a coniferous tree). Platform presence is more important than tree size.
    ii. Avoid removing or damaging known or potential nest trees, unless they are a confirmed safety hazard. For sites that have not been surveyed according to 2003 survey protocol, potential habitat is defined as (1) mature (with or without an old-

growth component) and old growth coniferous forests; **and** (2) younger coniferous forest that have platforms.

iii. Avoid removing or damaging trees with potential nesting platforms. A platform is a relatively flat surface at least 4-inch diameter and 33-feet high in the live crown of a coniferous tree. Platforms can be created by a wide bare branch, moss or lichen covering a branch, mistletoe, witches brooms, or other deformities, or structures such as squirrel nests.

iv. Project activities will not remove the function of suitable nesting habitat.
   - While habitat elements may be removed, such as individual large trees if they are a confirmed safety hazard, from nesting habitat, the treatment must not be so extensive as to remove the overall function of the nesting habitat, and will be conducted outside of the nesting season.

v. Non-suitable nest trees or limb trimming or pruning, brush trimming or removal, and hazard tree felling within suitable habitat may occur outside of the nesting season, 16 September to 23 March.

b. Auditory, Visual, or Other Disturbance:

i. Construction equipment must be in good working order, with emphasis on hydraulic and noise abatement systems. Hydraulic leakage and damaged mufflers (or spark arresters) must be promptly addressed and remedied to the degree practicable.

ii. No proposed activity generating sound levels 20 or more decibels above ambient sound levels **<u>or</u>** with maximum sound levels (ambient sound levels plus activity-generated sound levels) above 90 decibels (excluding vehicle back-up alarms) may occur within suitable marbled murrelet nesting habitat during the majority of the murrelet nesting season (*i.e.,* 24 March to 05 August)(Service 2006f).

iii. Between August 06 (date when most marbled murrelets have fledged in coastal northern California) and September 15 (end of marbled murrelet nesting season) of any year, project activities, with adjacent suitable nesting habitat, that will generate sound levels $\geq$10 dB above ambient sound levels will observe a daily work window beginning 2 hours post-sunrise and ending 2 hours pre-sunset. However, prep work that does not generate sound levels above ambient sound levels, including street sweeping and manual removal of pavement markers, can occur during all hours. The need for this daily work window depends on the distance between suitable nesting habitat and the above-ambient sound generating activity following the Service guidelines (Service 2006f). For example, if above-ambient sound levels generated by proposed activities will become attenuated back down to ambient sound levels prior to reaching suitable nesting habitat, the daily work window will not be necessary.

iv. No human activities will occur within visual line-of-sight of 40 m (131 feet) or less from a known nest or suitable nest tree during the nesting season (24 March to 15 September) (Service 2006f).

MAMU-2 Work Restrictions in Unoccupied Habitat: If recent protocol surveys determine that all suitable marbled murrelet nesting habitat within the Action Area is considered unoccupied, the auditory, visual, and other disturbance measures listed above do not apply for habitat determined to be unoccupied.

MAMU-3 Work Restrictions in Marbled Murrelet Critical Habitat: Ensure that there are no "adverse effects" to designated critical habitat for marbled murrelet within the Action Area. However, the Service has no specific quantitative thresholds, above which there will likely be an adverse effect to critical habitat. If a Subapplicant's proposed project encounters this situation, contact the Service to determine whether proposed habitat removal within designated critical habitat constitutes an adverse effect. Generally, the removal of a few small trees in unoccupied habitat will not result in "adverse effect" on designated critical habitat.

When working in designated critical habitat for marbled murrelet, all measures described in MAMU-1 Occupied Habitat, or MAMU-2 Unoccupied Habitat for reducing impacts in suitable habitat will also be implemented. This will help reduce effects, and may result in some instances in effects that are insignificant and discountable.

Western Snowy Plover Conservation Measures

The following avoidance and minimization measures apply to Action Areas within suitable snowy plover nesting habitat and designated critical habitat regardless of whether snowy plovers have been detected during Service-approved protocol surveys.

WSP-1 Seasonal Avoidance: Project construction activities in suitable nesting habitat will occur during the species non-breeding season: the period beginning October 1 and continuing through February 28 of the following year or through February 29 in a leap year.

WSP-2 Use of Handheld Tools Only: Project construction activities in suitable nesting habitat will be limited to the use of handheld tools, including handheld motorized implements such as chain saws and power augers. No heavy equipment will be allowed within suitable nesting habitat.

WSP-3 Guidelines for Handheld Tools: If handheld motorized implements are used, operators will employ best management practices to avoid and minimize soil and water contamination from fuel and lubricants. Measures include:

a. Use spill-resistant fuel and lubricant containers;
b. Consider the use of a portable containment pad for re-fueling in the field;
c. Immediately report petroleum spills to the landowner, or land management agency, and notify appropriate local authorities for advice and action on containment and cleanup of spills; and
d. Clearly mark the location and/or boundaries of the spill site to enable rapid remedial action.

WSP-4 Biological Monitor: If project construction activities occur in adjacent to, but not within suitable nesting habitat, then project activities will be conducted during the species non-breeding season, if possible. If non-breeding season construction is not possible, then the Subapplicant will employ a Service-approved biologist to conduct weekly western snowy plover surveys. If western snowy plovers are observed, the Service-approved biologist will notify the Service within 1 day of the observation and will monitor all construction activities conducted adjacent to western snowy plovers suitable nesting habitat. The qualified biologist will have the right and responsibility to stop work if adverse effects of nesting western snowy plovers are observed.

WSP-5 Flagging: When necessary to minimize the area affected by the project, the Subapplicant or their contractors will mark the work site boundaries with flagging or other visible materials, and remove those markers at the conclusion of the project.

WSP-6 Avoid Placement of Predator Perches: Workers will avoid temporary or permanent placement of structures (e.g., posts, railings, tall equipment, or fence lines) that could provide elevated perches for predatory birds.

WSP-7 Access Restrictions: Access to work sites will be by foot travel only. Motorized vehicles, including all-terrain vehicles, are not permitted on work sites located within suitable nesting habitat.

WSP-8 Site Restrictions: Vehicles used for transport of personnel will be restricted to existing parking lots or roadside parking areas.

WSP-9 Restore Contours of Temporarily Disturbed Areas: At the conclusion of the project, areas temporarily impacted by project activity will be restored to their pre-project condition (for example, footpaths are to be raked to their original ground contour and cut vegetation is to be removed or piled for future disposal).

WSP-10 Waste Management: Trash, food, food containers, and food waste will be secured at all times by individual workers, or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.

WSP-11 Prohibition of Pets Onsite: Pets will be prohibited from all work sites.

Northern Spotted Owl Conservation Measures

The following Conservation Measures are required for Subapplicant's proposed projects and their interrelated and interdependent activities that may affect the northern spotted owl (NSO). These measures are designed to reduce direct and indirect disturbance to individual NSOs, and habitat effects, to an insignificant and discountable level.

NSO-1 Contact the Service for NSO Data Records: If the Subapplicant's proposed project is located within suitable nesting, roosting or foraging habitat (NRF) for the NSO, and may directly or indirectly affect the NSO or its habitat, contact the Service to obtain contact information for local Forest Service, County, or other biologists who can provide NSO survey, Activity Center and habitat suitability data for the Action Area. An Activity Center represents the 'best of detections' such as a nest tree, an area used by roosting pairs or territorial singles, or an area of concentrated nighttime detections. This step will provide baseline information for the Action Area, and will help determine if and where surveys will be done, or if recent surveys have been completed.

NSO-2 Protocol Level Surveys: If NSO surveys have not been done, or are not current per the 2012 NSO Survey Protocol guidance (depending on activity), and surveys are planned, conduct them according to the 2012 NSO Survey Protocol and follow the seasonal restrictions described below for 'Surveyed Landscape'. If surveys are not planned or feasible, assume occupancy based on the presence of suitable NRF habitat; adhere to the guidance and seasonal restrictions described below for operating in an 'Un-surveyed Landscape'.

a. As an option to the full 6-visit protocol surveys described in the 2012 NSO Survey Protocol, three surveys can be conducted in the year of action implementation. If no NSOs are detected within 0.25 mile of the proposed activities, activities may proceed that year without seasonal restrictions.

NSO-3 Work Restrictions in Previously Surveyed Landscape: If surveys are completed or are current for the Action Area (based on surveys conducted by the applicant/project proponent, or other data provided from other agencies):

a. Do not conduct activities that result in loud or continuous noise above ambient levels within 0.25 mile (or 1,320 feet) of a nest site between February 1 and July 9.
    - This includes activities that generate sound levels 20 or more decibels above ambient sound levels or activities that generate maximum sound levels above 90 decibels, excluding vehicle back-up alarms. Maximum sound levels are the combined ambient and activity-generated sound levels.

b. Do not conduct any suitable habitat modification or smoke-generating activities within 0.25 mile (or 1,320 feet) of a nest site between February 1 and September 15.
    - Suitable habitat includes NSO NRF habitat. Modification includes cutting and removal of large trees, down logs or snags. Tree or limb trimming or pruning, brush trimming or removal, and hazard tree felling may occur as long as the noise levels described above are not exceeded during the critical breeding period of February 1-July 9.

NSO-4 Work Restrictions in Previously Un-surveyed Landscape: If surveys have not been completed and cannot be done, assume occupancy in the Action Area/portion of it based on the presence of suitable NRF habitat:

a. Do not conduct activities that result in loud and continuous noise above ambient levels within 0.25 mile (or 1,320 feet) of un-surveyed suitable NRF habitat between February 1 and July 9.
    - This includes activities that generate sound levels 20 or more decibels above ambient sound levels or activities that generate maximum sound levels above 90 decibels, excluding vehicle back-up alarms. Maximum sound levels are the combined ambient and activity-generated sound levels.

b. Do not conduct any suitable habitat modification or smoke-generating activities within 0.25 mile (or 1,320 feet) of un-surveyed suitable NRF habitat between February 1 and September 15.
    - Suitable habitat includes NSO NRF habitat. Modification includes cutting and removal of large trees, down logs or snags. Tree or limb trimming or pruning, brush trimming or removal, and hazard tree felling may occur as long as the noise levels described above are not exceeded during the critical breeding period of February 1-July 9.

NSO-5 Noise Abatement: Equipment must be in good working order with standard noise abatement devices attached.

NSO-6 Habitat Avoidance: Within all suitable NRF habitat:

a. Avoid removing or damaging known nest trees and associated screen trees, unless they are a confirmed safety hazard per the guidance documents from the implementing agency or another agency with jurisdiction in the Action Area.

b. Avoid removing or damaging trees or snags with potential nesting platforms and associated screen trees. These include trees with large flattened tops, large broken topped trees, trees with decadence such as large cavities, mistletoe broom structures, cat faces, or large limbs; or large snags with these similar characteristics.

c. Avoid removing large (20" diameter at breast height or larger) snags, unless they are a confirmed safety hazard per the implementing agency's guidance documents.

NSO-7 Avoid Reducing Habitat Quality: Project activities will not downgrade or remove the function of suitable nesting/roosting habitat to the degree that the habitat does not function in the capacity that existed pre-treatment:

a. While habitat elements may be removed, such as individual large trees or snags if they are a confirmed safety hazard, from nesting/roosting habitat, the treatment must not be so extensive as to downgrade or remove the overall function of the habitat.
b. If the Subapplicant's proposed project removes or downgrade nesting/roosting habitat function, this programmatic biological opinion is not applicable and a separate consultation with the Service is warranted.

NSO-8 Avoid Foraging Habitat: Within suitable foraging habitat in NSO core areas (0.5 mile radius, or 500-acre area, around an Activity Center) and within suitable foraging habitat in NSO home ranges (1.3 mile radius, including core, or 3,398-acre area around an Activity Center):

a. Avoid downgrading or removing suitable foraging habitat function.
b. While habitat elements may be removed, such as individual trees, shrubs, down logs and snags, from foraging habitat, the treatment must not be so extensive as to downgrade or remove the overall function of the habitat in an NSO core or home range below the recommended habitat levels for supporting survival, reproduction and occupancy (USDI-FWS 2009). This level is a combination of 400 acres of suitable NRF habitat in the core. For the home range, the level is 40 percent suitable NRF (approximately 1,336 acres).
c. If the Subapplicant's proposed project removes or downgrades suitable foraging habitat function in a core and home range to below the recommended levels, this programmatic biological opinion is not applicable and a separate consultation with the Service is warranted.

NSO-9 Work Restrictions in NSO Critical Habitat: When working in designated critical habitat, adhere to all measures described in NSO-6, NSO-7, and NSO-8 for reducing impacts in suitable nesting/roosting and foraging habitat. This will assure that effects to Physical and Biological Features (PBFs) of PBF-2 (nesting/roosting) and PBF-3 (foraging) are insignificant and discountable. Adhering to these Conservation Measures (NSO-6, NSO-7, and NSO-8 above) will also assure that effects to PBF-1 and PBF-4 are insignificant and discountable, given the larger scale at which effects to these critical habitat PBFs are to be considered under the 2012 Revised Critical Habitat final rule (77 FR 71876). PBF-1 refers to forest types that may be in early, mid, or late seral stages and that support the NSO across its geographical range. PBF-4 refers to habitat that supports the transience and colonization phases of dispersal.

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." For the proposed project, the Action Area encompasses the entire jurisdiction of the Sacramento Fish and Wildlife Office, which encompasses all or parts of 40 counties.
(https://www.fws.gov/sacramento/GIS_resources/Maps/Images/sacramento_jurisdiction.jpg)

Analytical Framework for the Jeopardy Determinations

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

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

In accordance with the implementing regulations for Section 7 and Service policy, the jeopardy determination is made in the following manner: the effects of the proposed federal action are evaluated in the context of the aggregate effects of all factors that have contributed to the current status of 42 species. Additionally, for non-Federal activities in the action area, we will evaluate those actions likely to affect the species in the future, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both its survival and recovery in the wild.

The following analysis places an emphasis on using the range-wide survival and recovery needs of the these species, and the role of the action area in providing for those needs as the context for evaluating the significance of the effects of the proposed programmatic Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Analytical Framework Adverse Modification

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

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

The DAM analysis in this biological opinion relies on four components: (1) the Status of Critical Habitat, which describes the range-wide condition of the critical habitat in terms of the key components (i.e., essential habitat features, primary constituent elements, or physical and biological features) that provide for the conservation of the listed species, the factors responsible for that condition, and the intended value of the critical habitat overall for the conservation/recovery of the listed species; (2) the Environmental Baseline, which analyzes the condition of the critical habitat in the action area, the factors responsible for that condition, and the value of the critical habitat in the action area for the conservation/recovery of the listed species; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed federal action and the effects of any interrelated and interdependent activities on the key components of critical habitat that provide for the conservation of the listed species, and how those impacts are likely to influence the conservation value of the affected critical habitat; and (4) Cumulative Effects, which evaluate the effects of future non-federal activities that are reasonably certain to occur in the action area on the key components of critical habitat that provide for the conservation of the listed species and how those impacts are likely to influence the conservation value of the affected critical habitat.

For purposes of making the DAM determination, the Service evaluates if the effects of the proposed federal action, taken together with cumulative effects, are likely to impair or preclude the capacity of critical habitat in the action area to serve its intended conservation function to an extent that appreciably diminishes the range wide 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.

Environmental Baseline and Status of the Species

Depending on the intensity of a disaster, it is possible for habitat areas directly impacted by disasters to be completely destroyed and landscapes to be severely altered. Additionally, during response and recovery efforts, areas outside of or undisturbed by a disaster may be affected due to the construction of new facilities, the relocation of existing facilities (e.g., schools or hospitals), or relocating the function of existing facilities. Therefore, the environmental baseline for the Action Area cannot be defined at this time.

California Red-Legged Frog

Listing Status

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

Description

The California red-legged frog is the largest native frog in the western United States (Wright and Wright 1949), ranging from 1.5 to 5.1 inches in length (Stebbins 2003). The abdomen and hind legs of adults are largely red, while the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background color. Dorsal spots usually have light centers (Stebbins 2003); dorsolateral folds are prominent on the back. The California red-legged frog is sexually dimorphic; the females are larger than the males (Dodd 2013a, b). California red-legged frog tadpoles range from 0.6 inch to 3.1 inches in length and the background color of the body is dark brown and yellow with darker spots (Storer 1925).

Current Status and Distribution

The historical range of the California red-legged frog extended from central Mendocino County and western Tehama County south in the California Coast Range to northern Baja California, Mexico, and in the Sierra Nevada/Cascade Ranges from Shasta County south to Madera County (Jennings and Hayes 1994). The species historically occurred from sea level to elevations of about 5,200 feet in 46 counties; however, currently the taxon is extant in 238 streams or drainages within only 22 counties, representing a loss of 70 percent of its former range (Service 2002). Isolated populations persist in several Sierra Nevada foothill locales and in Riverside County (Barry and Fellers 2013; Backlin et al. 2017; CDFW 2017; Gordon, R. and J. Bennett, pers. comm., 2017). The species is no longer considered extant in California's Central Valley due to significant declines caused by habitat modifications and exotic species (Fisher and Shaffer 1996). Currently, the California red-legged frog is widespread in the San Francisco Bay nine-county area (CDFW 2017). They are still locally abundant within the California coastal counties from Mendocino County to Los Angeles County and presumed extirpated in Orange and San Diego counties (CDFW 2017; Yang, D. and J. Martin, pers. comm., 2017; Gordon, R. and J. Bennett, pers. comm., 2017). Baja California represents the southernmost edge of the species' current range (Peralta-García et al. 2016).

Barry and Fellers (2013) conducted a comprehensive study to determine the current range of the California red-legged frog in the Sierra Nevada, concluding that it differs little from its historical range; however, the current Sierra Nevada populations appear to be small and tend to fluctuate. Since 1991, eleven California red-legged frog populations have been discovered or confirmed, including eight probable breeding populations (Barry and Fellers 2013; Mabe, J., pers. comm., 2017). Microsatellite and mitochondrial DNA analysis by Richmond et al. (2014) confirmed the Sierra Nevada populations of the California red-legged frog are genetically distinct from each other, as well as from other populations throughout the range of this species. The research concluded that the Sierra Nevada populations are persisting at low levels of genetic diversity and no contemporary gene flow across populations exist. On a larger geographic scale, range contraction has left a substantial gap between Sierra Nevada and Coast Range populations, similar to the gap separating the Southern California and Baja California populations (Richmond et al. 2014).

Habitat and Life History

Habitat: The California red-legged frog generally breeds in still or slow-moving water associated with emergent vegetation, such as cattails, tules (hardstem bulrush), or overhanging willows (Storer 1925; Fellers 2005). Aquatic breeding habitat predominantly includes permanent water sources such as streams, marshes, and natural and manmade ponds in valley bottoms and foothills (Jennings and Hayes 1994; Bulger et al. 2003; Stebbins 2003). Since the 1850's, manmade ponds may actually supplement stream pool breeding habit and can be capable of supporting large populations of this species. Breeding sites may hold water only seasonally, but sufficient water must persist at the beginning of the breeding season and into late summer or early fall for tadpoles to successfully complete metamorphosis. Breeding habitat does not include deep lacustrine water habitat (e.g., deep lakes and reservoirs 50 acres or larger in size) (Service 2010). Within the coastal lagoon habitats, salinity is a significant factor on embryonic mortality or abnormalities (Jennings and Hayes 1990). Jennings and Hayes (1990) conducted laboratory studies and field observations concluding salinity levels above 4.5 parts per thousand detrimentally affected the California red-legged frog embryos. Aquatic breeding habitat does not need to be available every year, but it must be available at least once within the frog's lifespan for breeding to occur (Service 2010).

Non-breeding aquatic habitat consists of shallow (non-lacustrine) freshwater features not suitable as breeding habitat, such as seasonal streams, small seeps, springs, and ponds that dry too quickly to support breeding. Non-breeding aquatic and riparian habitat is essential for providing the space, food, and cover necessary to sustain the California red-legged frog. Riparian habitat consists of vegetation growing nearby, but not typically in, a body of water on which it depends, and usually extends from the bank of a pond or stream to the margins of the associated floodplain (Service 2010). Adult California red-legged frogs may avoid coastal habitat with salinity levels greater than 6.5 parts per thousand (Jennings and Hayes 1990).

Cover and refugia are important habitat characteristic preferences for the species (Halstead and Kleeman 2017). Refugia may include vegetation, organic debris, animal burrows, boulders, rocks, logjams, industrial debris, or any other object that provides cover. Agricultural features such as watering troughs, spring boxes, abandoned sheds, or haystacks may also be utilized by the species. Incised stream channels with portions narrower and depths greater than 18 inches may also provide important summer sheltering habitat. During periods of high water flow, California red-legged frogs are rarely observed; individuals may seek refuge from high flows in pockets or small mammal burrows beneath banks stabilized by shrubby riparian growth (Jennings and Hayes 1994). Accessibility to cover habitat is essential for the survival of California red-legged frogs within a watershed and can be a factor limiting frog population numbers and survival.

Breeding: The California red-legged frog typically breeds between November and April; however, breeding may occur later in the Sierra Nevada Range (Barry 2002). Females deposit their egg masses on emergent vegetation, floating on or near the surface of the water. The California red-legged frog is often a prolific breeder, laying eggs during or shortly after large rainfall events in late winter and early spring. Egg masses containing 300-4,000 eggs hatch after six to fourteen days (Storer 1925; Jennings and Hayes 1994; Fellers 2005). Historically, the California red-legged frog in the Sierra Nevada likely bred within stream pools, which tend to be small with limited forage, constraining the size and number of populations (Barry and Fellers 2013).

California red-legged frog tadpoles undergo metamorphosis three to seven months following hatching. Most males reach sexual maturity in two years, while it takes approximately three years for females (Jennings and Hayes 1985; Fellers 2005). Under favorable conditions, California red-legged frogs may live eight to ten years (Jennings et al. 1992). Of the various life stages, tadpoles likely experience the highest mortality rates; only one percent of each egg mass completes metamorphosis (Jennings et al. 1992).

Diet: The California red-legged frog has a variable diet that changes with each of its life history stages. The feeding habits of the early stages are likely similar to other ranids, whose tadpoles feed on algae, diatoms, and detritus by grazing on the surface of rocks and vegetation (Fellers 2005). Hayes and Tennant (1985) found invertebrates to be the most common food items of adult California red-legged frogs collected in southern California; however, they speculated that this was opportunistic and varied based on prey availability. Vertebrates, such as Pacific tree frogs (*Hyla regilla*) and California mice (*Peromyscus californicus*), represented over half of the prey mass eaten by larger frogs, although invertebrates were the most numerous food items. Feeding typically occurs along the shoreline and on the surface of the water; juveniles appear to forage during both daytime and nighttime, whereas adults appear to feed at night (Hayes and Tennant 1985).

Movement: California red-legged frogs do not have a distinct breeding migration (Fellers 2005), rather they may move seasonally from non-breeding pools or refugia to breeding pools. Some individuals remain at breeding sites year-round while others disperse to neighboring water features or moist upland sites when breeding is complete and/or when breeding pools dry (Service 2002; Bulger et al. 2003; Fellers and Kleeman 2007; Tatarian and Tatarian 2008; Tatarian 2008). Studies in the several San Francisco Bay counties showed movements are typically along riparian corridors (Fellers and Kleeman 2007; Tatarian 2008). Although, some individuals, especially on rainy nights and in more mesic areas, travel without apparent regard to topography, vegetation type, or riparian corridors, and can move directly from one site to another through normally inhospitable habitats such as heavily grazed pastures or oak-grassland savannas (Bulger et al 2003).

California red-legged frogs show high site fidelity (Tatarian and Tatarian 2008) and typically do not move significant distances from breeding sites (Bulger et al. 2003; Fellers and Kleeman 2007; Tatarian and Tatarian 2008; Tatarian 2008). When traveling between aquatic sites, California red-legged frogs typically travel less than 0.31 miles (Fellers and Kleeman 2007; Tatarian and Tatarian 2008), although they have been documented to move more than two miles in Santa Cruz County (Bulger et al. 2003). Various studies have found that the frogs typically do not make terrestrial forays further than 200 feet from aquatic habitat (Bulger et al. 2003; Fellers and Kleeman 2007; Tatarian and Tatarian 2008; Tatarian 2008). Upland movements are typically associated with precipitation events and usually last for one to four days (Tatarian 2008).

Threats

Factors associated with declining populations of the California red-legged frog throughout its range include degradation and loss of habitat through agriculture, urbanization, mining, overgrazing, recreation, timber harvesting, non-native species, impoundments, water diversions, erosion and siltation altering upland and aquatic habitat, degraded water quality, use of pesticides, and introduced predators (Service 2002, 2010). Urbanization often leaves isolated habitat fragments and creates barriers to frog dispersal.

Non-native species pose a major threat to the recovery of California red-legged frogs. Several researchers have noted the decline and eventual local disappearance of California and northern red-legged frogs in systems supporting bullfrogs (Jennings and Hayes 1990; Twedt 1993), red swamp crayfish, signal crayfish, and several species of warm water fish including sunfish, goldfish, common carp, and mosquitofish (Moyle 1976; Barry 1992; Hunt 1993; Fisher and Shaffer 1996). The decline of the California red-legged frog due to these non-native species has been attributed to predation, competition, and reproduction interference (Twedt 1993; Bury and Whelan 1984; Storer 1933; Emlen 1977; Kruse and Francis 1977; Jennings and Hays 1990; Jennings 1993).

Chytridiomycosis, an infectious disease caused by the chytrid fungus, *Batrachochytrium dendrobatidis* (*Bd*), has been found to adversely affect amphibians globally (Davidson et al. 2003; Lips et al. 2006). While *Bd* prevalence in wild amphibian populations in California is unknown (Fellers et al. 2011), chytrid is expected to be widespread throughout much of the California red-legged frog's range. The chytrid fungus has been documented within the California red-legged frog populations at Point Reyes National Seashore, two properties in Santa Clara County, Yosemite National Park, Hughes Pond, Sailor Flat, Big Gun Diggings, and Spivey Pond (Padgett-Flohr and Hopkins 2010; Tatarian and Tatarian 2010; Fellers et al. 2011; Barry and Fellers 2013). However, no chytrid-related mortality has been reported in these populations, suggesting that California red-legged frogs are less vulnerable to the pathogenic effects of chytrid infection than other amphibian species (Tatarian and Tatarian 2010; Barry and Fellers 2013; Fellers et al. 2017). While chytrid infection may not directly lead to mortality in California red-legged frogs, Padgett-Flohr (2008) states that this infection may reduce overall fitness and could lead to long-term effects. Therefore, it is difficult to estimate the full extent and risk of chytridiomycosis to the California red-legged frog populations.

Recovery Plan

The Recovery Plan for the California red-legged frog identifies eight recovery units (Service 2002). Based on various regional areas of the species' range, the establishment of these recovery units are essential to its survival and recovery. 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, delineated core areas, designed to protect metapopulations, represent contiguous areas of moderate to high California red-legged frog densities. The management strategy identified within this Recovery Plan will allow for the recolonization of habitats within and adjacent to core areas naturally subjected to periodic localized extinctions, thus assuring the long-term survival and recovery of California red-legged frogs.

Critical Habitat

The Service designated critical habitat for the California red-legged frog on March 13, 2001 (Service 2001a) and a revised designation to the critical habitat was published on April 13, 2006 (Service 2006b) and again on March 17, 2010 (Service 2010). At this time, the Service recognized the taxonomic change from *Rana aurora draytonii* to *Rana draytonii* (Shaffer *et al.* 2010). The rule identifies approximately 1,636,609 acres within 48 critical habitat units in Alameda, Butte, Calaveras, Contra Costa, El Dorado, Kern, Kings, Los Angeles, Marin, Mendocino, Merced, Monterey, Napa, Nevada, Placer, San Benito, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Cruz, Solano, Sonoma, Stanislaus, Ventura, and Yuba Counties, California.

The physical and biological features (PBFs) defined for the California red-legged frog were derived from its biological needs. The area designated as revised critical habitat provides aquatic habitat for breeding and non-breeding activities and upland habitat for shelter, foraging, predator avoidance, and dispersal across its range. The PBFs and, therefore, the resulting physical and biological features essential for the conservation of the species were determined from studies of California red-legged frog ecology. Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, the Service determined that the PBFs essential to the conservation of the California red-legged frog are:

> <u>PBF 1 Aquatic Breeding:</u> Habitat Standing bodies of fresh water (with salinities less than 7.0 parts per thousand), including: natural and manmade (e.g., 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;
>
> <u>PBF 2 Non-Breeding Aquatic Habitat:</u> Freshwater and wetted riparian habitats, as described above, that may not hold water long enough for the subspecies to hatch and complete its aquatic life cycle but that do provide for shelter, foraging, predator avoidance, and aquatic dispersal for juvenile and adult California red-legged frogs. Other wetland habitats considered to meet these elements include, but are not limited to: plunge pools within intermittent creeks; seeps; quiet water refugia during high water flows; and springs of sufficient flow to withstand the summer dry period.

PBF 3 Upland Habitat: Upland areas adjacent to or surrounding breeding and non-breeding aquatic and riparian habitat up to a distance of one mile in most cases and comprised of various vegetation series such as grasslands, woodlands, wetland, or riparian plant species that provide the frog shelter, forage, and predator avoidance. Upland features are also essential in that they are needed to maintain the hydrologic, geographic, topographic, ecological, and edaphic features that support and surround the wetland or riparian habitat. These upland features contribute to the filling and drying of the wetland or riparian habitat and are responsible for maintaining suitable periods of pool inundation for larval frogs and their food sources, and provide breeding, non-breeding, feeding, and sheltering habitat for juvenile and adult frogs (e.g., shelter, shade, moisture, cooler temperatures, a prey base, foraging opportunities, and areas for predator avoidance). Upland habitat should include structural features such as boulders, rocks and organic debris (e.g., downed trees, logs), as well as small mammal burrows and moist leaf litter; and

PBF 4: Dispersal Habitat: Accessible upland or riparian dispersal habitat within designated units and between occupied locations within a minimum of 1 mile of each other that allow for movement between such sites. Dispersal habitat includes various natural habitats and altered habitats such as agricultural fields, which do not contain barriers (e.g., heavily traveled road 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 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 subspecies.

With the revised designation of critical habitat, the Service intends to conserve the geographic areas containing the physical and biological features that are essential to the conservation of the species, through the identification of the appropriate quantity and spatial arrangement of the PBFs sufficient to support the life-history functions of the species.

Based on the documented presence of this species in the Action Area, and the biology and ecology of this species, the Service has determined that the California red-legged frog is likely to be present in the Action Area and use this area for breeding, sheltering, foraging, and dispersal.

California Tiger Salamander Central Distinct Population Segment

The central California tiger salamander occurs or has the potential to occur within the Action Area in Alameda, Amador, Calaveras, Contra Costa, Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, Sacramento, San Benito, San Mateo, San Joaquin, San Luis Obispo, Santa Clara, Santa Cruz, Stanislaus, Solano, Tulare, Tuolumne, and Yolo Counties (Service 2017b). The CNDDB (2018) lists 1,177 occurrences throughout its range. The central California tiger salamander occurs at sites on the Central Valley floor near sea level, up to a maximum elevation of roughly 3,940 feet (1,200 meters) in the Coast Ranges and 1,640 feet (500 meters) in the Sierra Nevada foothills Shaffer et al. 2013). Central California tiger salamanders are adapted to breeding in natural vernal pools and ponds; however, they now frequently use livestock ponds and other modified ephemeral and permanent ponds (Service 2014a). Upland habitats surrounding known central California tiger salamander breeding pools are usually dominated by grassland, oak savanna, or oak woodland (CNDDB 2015). The species requires upland habitat that is occupied by small burrowing mammals such as California ground squirrel (*Otospermophilus beecheyi*) and Botta's pocket gopher (*Thommomys bottae*) that create underground burrow systems used by the salamanders throughout the year (Shaffer et al. 1993; Seymour and Westphal 1994; Loredo et al. 1996; Pittman 2005). Large tracts of upland habitat, preferably with multiple breeding ponds, are necessary for the Central California tiger salamander to persist.

Multiple factors have contributed to population declines of the central California tiger salamander, including habitat loss and fragmentation due to agriculture and urbanization; predation from and competition with invasive species; hybridization with non-native barred tiger salamanders (*Ambystoma tigrinum*) (sometimes referred to as *Ambystoma tigrinum mavortium*) (Fitzpatrick and Shaffer 2004; Riley *et al.* 2003); mortality from road crossings; contaminants; and small mammal burrow control efforts (Service 2004, 2014a). Other threats include disease, predation, interspecific competition, exposure to contaminants, and rodent and mosquito control (Service 2004, 2014a).

The Recovery Plan for the Central California tiger salamander (Service 2017a) identifies four recovery units: Central Valley, Southern San Joaquin Valley, Bay Area and Central Coast Range. The Action Area includes all recovery units and occurrences. While there have been continued losses of central California tiger salamander habitat, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander (*Ambystoma californiense*) (Service 2017a).

Critical Habitat

The Service designated critical habitat for the Central California tiger salamander on September 22, 2005 (Service 2005b). The rule identifies approximately 199,109 acres within 32 critical habitat units in Alameda, Amador, Calaveras, Contra Costa, Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, Sacramento, San Benito, San Joaquin, San Luis Obispo, Santa Clara, Solano, Stanislaus, Tulare, and Yolo Counties, California.

The PBFs defined for the Central California tiger salamander were derived from its biological needs. The area designated as revised critical habitat provides aquatic habitat for breeding and non-breeding activities and upland habitat for shelter, foraging, predator avoidance, and dispersal across its range. The PBFs and, therefore, the resulting physical and biological features essential for the conservation of the species were determined from studies of California tiger salamander ecology. Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, the Service determined that the PBFs essential to the conservation of the Central California tiger salamander are:

PBF 1 Aquatic Breeding Habitat: 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;

PBF 2 Upland Habitat Upland: habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground habitat that Central California tiger salamanders depend upon for food, shelter, and protection from the elements and predation; and

PBF 3 Dispersal Habitat: Accessible upland dispersal habitat between occupied locations that allow for movement between such sites.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the central California tiger salamander occurs within the Action Area.

California Tiger Salamander Sonoma Distinct Population Segment

The Sonoma California tiger salamander occurs or has the potential to occur within the Action Area, in Sonoma County. The CNDDB (2018) lists 81 currently known occurrences within Sonoma County. The Sonoma County California tiger salamander inhabits vernal pools and seasonal ponds, associated grassland, and oak savannah plant communities below 200 feet (60 meters) (Service 2003a). They also use modified ephemeral or permanent ponds and manmade features such as constructed ponds or livestock ponds (Service 2016). Sonoma County California tiger salamanders spend the majority of their lives underground in small mammal burrows in uplands, while ephemeral ponds play a critical role because they are necessary for breeding. As with the Central California tiger salamander, large tracts of upland habitat, preferably with multiple breeding ponds, are necessary for the Sonoma tiger salamander to persist (Service 2016).

The primary threats the Sonoma County California tiger salamander are the modification and destruction of suitable habitat due to urbanization, agricultural conversion, and competition with non-native plants. In addition to habitat loss, the fragmented condition of remaining Sonoma County California tiger salamander habitat restricts migration between aquatic breeding sites and upland non-breeding habitat, along with dispersal among aquatic breeding sites (Cook *et al.* 2005). Since 1991, these threats have continued to such an extent that many populations appear to have been extirpated or severely reduced in numbers.

The Recovery Plan for the Santa Rosa Plains (Service 2016) identifies three core areas for the Sonoma County California tiger salamander (Wright-Kelly Core Area, Llano Crescent-Stony Point Core Area, and West Cotati Core Area) and four bounded management areas (the Alton Lane, Horn-Hunter, Americano-Stemple, and East Cotati Management Areas). The Action Area includes all occurrences and core areas. While there have been continued losses of Central California tiger salamander habitat, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the range-wide status of this plant species, please refer to the Recovery Plan for the Santa Rosa Plains (Service 2016).

Critical Habitat

The Service designated critical habitat for the Sonoma California tiger salamander on December 14, 2005 (Service 2005c) and a revised designation to the critical habitat was published on August 31, 2011 (Service 2011a). The rule identifies approximately 47,383 acres within one critical habitat unit in Sonoma County, California.

Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, the Service determined that the following PBFs are essential to the conservation of the Sonoma County California tiger salamander:

PBF 1 Aquatic Breeding Habitat: standing bodies of fresh water (including natural and manmade (e.g., stock) ponds, vernal pools and other ephemeral or permanent water bodies that typically support inundation during winter/early spring and hold water for a minimum of 12 consecutive weeks in a year of average rainfall);

PBF 2 Upland Habitat: upland habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground refugia that Sonoma County California tiger salamanders depend upon for food, shelter, and protection from the elements and predation; and

PBF 3 Dispersal Habitat: accessible upland dispersal habitat between occupied locations that allow for movement between such sites.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the Sonoma California tiger salamander occurs within the Action Area.

Giant Garter Snake

The giant garter snake occurs or has the potential to occur within the Action Area in Sacramento and San Joaquin Valleys. The giant garter snake is endemic to the wetlands of the Sacramento and San Joaquin Valleys of California. The CNDDB (2018) lists 366 occurrences of the species in Amador, Butte, Colusa, Contra Costa, Fresno, Glenn, Kern, Madera, Merced, Sacramento, San Joaquin, Solano, Sutter, Yolo, and Yuba Counties. The giant garter snake now inhabits the remaining high-quality fragmented wetlands that include marshes, ponds, small lakes, low-gradient streams with silt substrates, and managed waterways (Service 2017a). Giant garter snakes typically occur in or adjacent to aquatic habitats possessing protective emergent vegetative cover that allow for foraging. Upland areas are also an important habitat component; the giant garter snake spends half of the year, roughly November through April, hibernating in uplands. The snake also is known to spend more than half the time in terrestrial environments during the active period during summer (Halstead et al. 2015b). While in such terrestrial habitats in summer, the snake is often underground, especially during extreme temperatures. Animal burrows are considered an important component of upland refugia, although other elements such as brush piles and even riprap may be used (e.g., Wylie and Amarello 2008). Although snakes can venture as much as 500 feet or more from the water edge, the overwhelming majority of both the summer and winter upland captures are within the first 10 meters from the water edge.

Threats to giant garter snake include habitat loss from urbanization, the subsequent fragmentation and population isolation, flood channel maintenance, agricultural practices (e.g., rice fallowing due to drought conditions, habitat disturbance and loss from irrigation and drainage ditch maintenance), climate change, water transfers, and invasive species. Habitat fragmentation restricts dispersal and isolates giant garter snake populations, increasing the likelihood of inbreeding, decreasing fitness, and reducing genetic diversity. These factors have ultimately resulted in the snake's extirpation from the southern one-third of its range in former wetlands associated with the historical Buena Vista, Tulare, and Kern lakebeds. In addition to habitat loss, the remaining Central Valley populations of the giant garter snake are subject to the cumulative effects of a number of other existing and potential threats, including roads and vehicular traffic, climate change, and predation by non-native species.

The Recovery Plan (Service 2017a) for the giant garter snake identifies nine recovery units that correspond directly to the nine geographically and genetically distinct populations: Butte Basin, Colusa Basin, Sutter Basin, American Basin, Yolo Basin, Delta Basin, Cosumnes-Mokelumne Basin, San Joaquin Basin, and Tulare Basin. The Action Area includes all recovery units and occurrences.

While there have been continued losses of giant garter snake habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Recovery Plan for the Giant Garter Snake *(Thamnophis gigas)* (Service 2017a).

Critical Habitat

Critical habitat has not been designated for the giant garter snake.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the giant garter snake occurs within the Action Area.

<u>Alameda Whipsnake</u>

The Alameda whipsnake occurs or has the potential to occur within the Action Area in Alameda, Contra Costa, western San Joaquin, northern Santa Clara, and northwestern Stanislaus Counties. The CNDDB (2018) lists 164 occurrences for Alameda whipsnake, the majority of which are in the Mount Diablo State Park and Los Vaqueros Watershed specifically, and on various East Bay Regional Park land. The current distribution is five populations within a fragmented regional metapopulation (Service 2002b). General habitat types of Alameda whipsnake include chaparral and coastal scrub, and associated native vegetation and rock land up to 500 feet (150 meters) from chaparral and coastal scrub (Service 2011e). While the Alameda whipsnake uses all slope aspects and brush community canopy closures, Swaim (1994) found areas of concentrated use on southwest-, south-, southeast-, east-, or northeast-facing slopes at both the Tilden Regional Park and the Moller Ranch.

Habitat loss and fragmentation are the primary threats to the Alameda whipsnake. Habitat loss and fragmentation from urban development, associated impacts due to increased population densities and associated highway and road construction likely has prevented or severely reduced movement of individuals between areas of suitable habitat, and exacerbated impacts of other threats. Urban development has also reduced the total amount of suitable habitat available for the Alameda whipsnake. Other current threats to the habitat of the Alameda whipsnake are incompatible grazing practices; spread of nonnative plants; increased predation from native and nonnative predators associated with urbanization; unauthorized collection; and alteration of suitable habitat from fire suppression, which creates closed-canopy habitat and increases fire severity.

The Draft Recovery Plan for the Alameda whipsnake (Service 2002b) identifies seven Recovery Units: Unit 1 (Tilden-Briones), Unit 2 (Oakland-Las Trampas), Unit 3 (Hayward-Pleasanton Ridge), Unit 4 (Mount Diablo-Black Hills), Unit 5 (Sunol-Cedar Mountain), Unit 6 (Caldecott Tunnel Corridor) and Unit 7 (Niles Canyon/Sunol Corridor). The Action Area includes all recovery units and occurrences. While there have been continued losses of Alameda whipsnake habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Alameda Whipsnake (*Masticophis lateralis euryxanthus*) 5-year Review: Summary and Evaluation (Service 2011e). No change in the species' listing status was recommended in this species' 5-year review.

Critical Habitat

On October 2, 2006, the Service published the final rule determining critical habitat for the Alameda whipsnake in the Federal Register (Service 2006c). The rule designates approximately 154,834 acres within six critical habitat units in Alameda, Contra Costa, Santa Clara, and San Joaquin counties, California.

Based on our current knowledge of the life history, biology, and ecology of the Alameda whipsnake and the requirements of the habitat necessary to sustain the essential life history functions of the subspecies, the Service has determined that the PBFs for the Alameda whipsnake are:

PBF 1: Scrub/shrub communities with a mosaic of open and closed canopy. Scrub/shrub vegetation dominated by low-to medium-stature woody shrubs with a mosaic of open and closed canopy as characterized by the chamise, chamise-eastwood manzanita, chaparral whitethorn, and interior live oak shrub vegetation series (as identified in the Manual of California Vegetation (Sawyer and Keeler-Wolf 1995), A Guide to Wildlife Habitats of California (Mayer and Laudenslayer 1988), and California Wildlife Habitat Relationship System (CDFG 1998)), occurring at elevations from sea level to approximately 3,850 feet. Such scrub/ shrub vegetation within these series forms a pattern of open and closed canopy used by the Alameda whipsnake for shelter from predators; temperature regulation because it provides sunny and shady locations; prey-viewing opportunities; and nesting habitat and substrate. These features contribute to support a prey base consisting of western fence lizards and other prey species such as skinks, frogs, snakes, and buds;

PBF 2: Woodland or annual grassland plant communities contiguous to lands that contain PBF 1. Woodland or annual grassland vegetation series comprised of one or more of the following: blue oak, coast live oak, California bay, California buckeye, and California annual grassland vegetation series (as identified in the Manual of California Vegetation (Sawyer and Keeler-Wolf 1995), A Guide to Wildlife Habitats of California ((Mayer and Laudenslayer 1988), and California Wildlife Habitat Relationship System (CDFG 1998)) are PBF 2. This mosaic of vegetation is essential to the conservation of the Alameda whipsnake because it supports a prey base, consisting of western fence lizards and other prey species such as skinks, frogs, snakes, and buds. This provides opportunities for foraging by allowing snakes to come in contact with and visualize, track, and capture prey (especially western fence lizards along with other prey such as skinks, frogs, buds); short and long distance dispersal within, between, or to adjacent areas containing essential features (i.e., PBF 1 or PBF 3); and contact with other Alameda whipsnakes for mating and reproduction; and

PBF 3: Lands containing rock outcrops, talus, and small mammal burrows within or adjacent to PBF 1 and or PBF 2. These areas are essential to the conservation of the Alameda whipsnake because they are used for retreats (shelter), hibernacula, foraging and dispersal, and provide additional prey population support functions. Refer to the final designation of critical habitat for additional information.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the Alameda whipsnake occurs within the Action Area.

Least Bell's Vireo

The least Bell's vireo occurs or has the potential to occur within the Action Area in Sacramento, San Joaquin, Santa Clara, Tulare, Kern, Inyo, Yolo and Stanislaus Counties. The CNDDB (2018) lists 483 occurrences for the species. Least Bell's vireos are obligate riparian breeders, inhabiting structurally diverse woodlands along watercourses. They occur in a diversity of riparian habitat types including cottonwood-willow woodlands/forests, oaks woodlands, and mule fat scrub. (Service 1998d).

Threats to the least Bell's vireo include riparian habitat loss from agricultural, urban, and commercial developments, flood control and river channelization projects, livestock grazing and other activities, which have severely restricted the species' range and fragmented remaining habitat. Because of widespread riparian habitat losses, remaining breeding birds are segregated into small, disjunct and widely dispersed remnant populations, making them more vulnerable to extirpation than larger populations are (Franzreb 1989). When local habitats are lost and no nearby habitat is available for dispersal until damaged riparian habitat regenerates, vireos may be forced into habitats less suitable to their nesting and foraging requirements. This could resulting in increased mortality, reduced reproductive success, and declining population numbers (Franzreb 1989). Vireos also suffer from limited reproductive success as the result of nest parasitism by the brown-headed cowbird *(Molothrns ater),* which combined with habitat loss has resulted in a decline in the overall vireo population to about 300 breeding pairs.

The Draft Recovery Plan for the least Bell's vireo (Service 1998d) does not identify Recovery Units. However, it identifies population/metapopulation units needed for recovery. These include the San Joaquin Valley and the Sacramento Valley. The Action Area includes all occurrences and units. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Least Bell's Vireo (*Vireo bellii pusillus*) 5-year Review: Summary and Evaluation (Service 2006d). No change in the species' listing status was recommended in this species' 5-year review.

Critical Habitat

The Service designated critical habitat for the least Bell's vireo on February 2, 1994 (Service 1994). This rule identifies 38,000 acres within 10 critical habitat units in Los Angeles, Riverside, San Bernardino, San Diego, Santa Barbara, and Ventura Counties, California. No units are within the Action Area for the Sacramento Fish and Wildlife Office.

The PBFs of critical habitat for the least Bell's vireo are the riverine and floodplain habitats (particularly willow-dominated riparian woodland with dense understory vegetation maintained, in part, in a non-climax stage by periodic floods or other agents) and adjacent coastal sage scrub, chaparral, or other upland plant communities. Vireos meet their survival and reproductive needs (food, cover, nest sites, and nestling and fledgling protection) within the riparian zone in most areas. In some areas they also forage in adjacent upland habitats.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the least Bell's vireo occurs within the Action Area.

Tidewater Goby

The tidewater goby *(Eucyclogobius newberryi*), occurs within the Action Area in Sonoma, Marin, Alameda, Contra Costa, San Francisco and San Mateo Counties. The CNDDB (2018) lists 127 occurrences. The geographic range of the tidewater goby is limited to the coast of California (Eschmeyer *et al.* 1983, p. 262; Swift *et al.* 1989, p. 12) where it inhabits discrete locations of brackish water along the California coast. Tidewater goby localities closely correspond to major stream drainages (Swift et al. 1989; Habel and Armstrong 1977) where they generally select habitat in the upper estuary, usually within the fresh-saltwater interface. Tidewater gobies range upstream a short distance into fresh water, and downstream into water of up to about 75 percent sea water (28 parts per thousand). The species is typically found in salinities of less than 12 parts per thousand (Swift et al. 1989). These conditions occur in two relatively distinct situations: 1) the upper edge of tidal bays, such as Tomales, Bolinas, and San Francisco Bays near the entrance of freshwater tributaries and 2) the coastal lagoons formed at the mouths of coastal rivers, streams, or seasonally wet canyons.

Threats to the tidewater goby include loss of wetland and associated habitat due to development along the coast. These include wetland draining and filling for industrial and residential development; dredging to develop navigation channels, harbors, and marinas; hydrologic changes such as water diversion and related changes in salinity, groundwater overdrafting, channelization, and sand bar breaching (Service 2005d).

The Recovery Plan for the Tidewater Goby (Service 2005d) identifies one Recovery Unit, the Greater Bay Unit, within the Sacramento Fish and Wildlife Office jurisdiction. The Action Area includes all occurrences and this recovery unit. For the most recent comprehensive assessment of the species' range-wide status, please refer to the 12 month Finding and Proposed Rule to Reclassify the Tidewater Goby from Endangered to Threatened (Service 2014a).

Critical Habitat

The Service designated critical habitat for the tidewater goby on November 20, 2000 (Service 2000), and a revised designation to the critical habitat was published on January 31, 2008 (Service 2008a) and again on February 6, 2013 (Service 2013b). This rule identifies 12,156 acres of within 44 critical habitat units 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. There is approximately 1,728 acres of designated critical habitat for the tidewater goby within the jurisdictional boundary of the Sacramento Fish and Wildlife Office.

Based on our current knowledge of the physical or biological features and habitat characteristics required to sustain the species' life-history processes, we determine that the physical and biological features (PBFs) specific to the tidewater goby are:

PBF-1: Persistent, shallow (in the range of approximately 0.3 to 6.6 feet (0.1 to 2 meters)), still-to-slow-moving lagoons, estuaries, and coastal streams with salinity up to 12 parts per thousand, which provide adequate space for normal behavior and individual an 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 latifolia*, 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.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the tidewater goby occurs within the Action Area.

Valley Elderberry Longhorn Beetle

The valley elderberry longhorn beetle (VELB) *(Desmocerus californicus dimorphus*), occurs within the California Central Valley. The CNDDB (2018) lists 271 occurrences for this species. The species' range extends from approximately Shasta County south to Fresno County, including the valley floor and lower foothills. The majority of VELB are documented below 500 feet (152 meters) in elevation. VELB habitat includes both riparian and non-riparian areas where elderberry shrubs are present. They occur only in association with its host plant, elderberry (*Sambucus* ssp.).

The primary threat to VELB and its elderberry shrub host plant are the significant loss, degradation or modification of riparian and other natural habitats. The species is estimated to occupy only 16 to 21 percent of its historical range. The result is a rare, patchy distribution within the limited and fragmented riparian areas within the California Central Valley. Riparian habitat loss is associated with agriculture conversion, levee construction and maintenance and stream channelization, and the impacts associated with urbanization. Impacts to elderberry shrubs associated maintenance activities include pruning of elderberry shrub branches along levees, roadways, trails, and other areas to control visual obstructions, or for aesthetic reasons. Invasive nonnative plants may affect the species through competition for space and resources with its host plant (Service 2014c).

The recovery plan for VELB does not identify recovery units. However, the Action Area includes all known occurrences and habitat for the species. While there have been continued losses of VELB habitat throughout its range, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the range-wide status of the beetle, please refer to the Withdrawal of the Proposed Rule to Remove the Valley Elderberry Longhorn Beetle from the Federal List of Endangered and Threatened Wildlife (Service 2014c).

Critical Habitat

On August 8, 1980, the final rule determining critical habitat for the valley elderberry longhorn beetle was published in the Federal Register on August 8, 1980 (Service 1980). Within the Action Area, the rule designates approximately 515 acres within two critical habitat units in Sacramento County, California. These designated areas of critical habitat are the American River Parkway Zone, an area along the lower American River at Goethe and Ancil Hoffman Parks, and the Sacramento Zone, an area located approximately one-half-mile from the American River downstream from the American River Parkway Zone. These critical habitat areas support large numbers of mature elderberry shrubs with extensive evidence of beetle use.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the VELB occurs within the Action Area.

California Freshwater Shrimp

The California freshwater shrimp occurs or has the potential to occur within the Action Area in Marin, Napa, and Sonoma Counties. The CNDDB (2018) lists 20 occurrences for the California freshwater shrimp. At the time of the most recent 5-year review, California freshwater shrimp were found in 23 streams: Atascadero Creek, Big Austin Creek, Blucher Creek, Bud Creek, Cheda Creek, East Austin Creek, Ebabias Creek, Fallon Creek, Franz Creek, Garnett Creek, Green Valley Creek, Huichica Creek and an unnamed tributary to Huichica Creek, Jonive Creek, Keys Creek, Lagunitas Creek, Napa River, Olema Creek, Redwood Creek, Salmon Creek, Sonoma Creek, Stemple Creek, Walker Creek, and Yulupa Creek (Service 2011c). CNDDB identifies one additional stream as having California freshwater shrimp: Hudspeth Creek. The California freshwater shrimp is found in low elevation (less than 116 meters, 380 feet), low gradient (generally less than 1 percent) perennial freshwater streams or intermittent streams with perennial pools where banks are structurally diverse with undercut banks, exposed roots, overhanging woody debris, or overhanging vegetation (Service 1998b).

Threats to the California freshwater shrimp and its habitat include agricultural activities, residential development, water pollution, water diversions, recreation activities (summer dams), chemicals, and channelization. Additional threats include gravel mining, water development, urban runoff, flood control, and bank protection (Service 2011c).

The Recovery Plan for the California Freshwater Shrimp (Service 1998b) does not have recovery units *per se*; however, it does identify four watersheds with known populations that require a watershed plan for down listing. These watersheds are the tributary streams in the lower Russian River drainage, coastal streams flowing directly into the Pacific Ocean, streams draining into Tomales Bay, and streams flowing into San Pablo Bay. The Action Area includes all occurrences. While there have been continued losses of California freshwater shrimp habitat throughout its range, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the range-wide status, please refer to the California freshwater shrimp (*Syncaris pacifica*) 5-Year Review: Summary and Evaluation (Service 2011c). No change in the species' listing status was recommended in this species' 5-year review.

Critical Habitat

Critical habitat has not been designated for the California freshwater shrimp.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the California freshwater shrimp occurs within the Action Area.

Bay Checkerspot Butterfly

The Bay checkerspot butterfly occurs or has the potential to occur within the Action Area in Santa Clara and San Mateo Counties. The CNDDB (2018) lists 19 occurrences for the Bay checkerspot butterfly. Currently, the species is largely restricted to grasslands with host plants on serpentine-like soils in Santa Clara and San Mateo Counties. It also occurs in non-serpentine annual grassland occupied by its host plants on San Bruno Mountain in San Mateo County, where it was extirpated until recently reintroduced to serpentine grasslands in Edgewood Park and non-serpentine annual grasslands at San Bruno Mountain. The primary larval host plant for the butterfly is a small, annual, native plantain (*Plantago erecta*) (Service 1998c). The butterfly also frequently requires the presence of a secondary host plant, either purple owl's-clover (*Castilleja densiflora*) or exserted paintbrush (*Castilleja exserta*) (Singer 1972, p. 76; Murphy and Ehrlich 1980, p. 316; Weiss 1999, p. 1478) since owl's clover and the paintbrush remain edible longer than the plantain.

The primary threats to the Bay checkerspot butterfly are habitat degradation and loss caused by non-native plants displacing or reducing native food plants, and urban and suburban development (Service 1998c). Habitat loss has reduced the number and size of extant Bay checkerspot butterfly populations. Smaller populations are more vulnerable to extinction. Loss of serpentine of habitats or reduction of these habitats to non-viable sizes has increased the distance between populations and making genetic exchange and recolonization more difficult (Service 1998c). Invasion of non-native species into native grasslands is also a major cause of decline, choking out native food and host plant species. Trampling associated with increased human activity also threatens eggs, larvae and adult butterflies. Hikers, bicyclists, and off-road vehicles can crush larvae. These activities may also harm food plants, indirectly decreasing larval survival. Other noted threats include illegal collection, inappropriate grazing practices, pesticide use and road kill.

The Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area (Service 1998c), which includes the Bay checkerspot butterfly, identifies five core areas: one on the San Francisco peninsula in San Mateo County (Edgewood County Park) and four in Santa Clara County (Coyote Ridge in Santa Clara County), as well as a number of satellite populations. The Action Area includes all occurrences and recovery areas. While there have been continued losses of Bay checkerspot butterfly habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the range-wide status, please refer to the Bay Checkerspot Butterfly *(Euphydryas editha bayensis)* 5-Year Review: Summary and Evaluation (Service 2009a). No change in the species' listing status was recommended in this species' 5-year review.

Critical Habitat

The Service designated critical habitat for the Bay checkerspot butterfly on February 29, 2001 (Service 2001b) and a revised designation to the critical habitat was published on August 26, 2008 (Service 2008b). The rule identifies 18,293 acres within 13 critical habitat units in San Mateo and Santa Clara Counties, California. All of these acres and units are within the Sacramento Fish and Wildlife Office Action Area.

Within these units that are considered to be essential for the conservation and recovery of the Bay checkerspot butterfly, the Service has determined the following physical and biological features:

<u>PBF 1</u>: The presence of annual or perennial grasslands with little to no overstory that provide north-south and east-west slopes with a tilt of more than 7 degrees for larval host plant survival during periods of atypical weather (for example, drought). Common grassland species include wild oats (*Avena fatua*), soft chess (*Bromus hordeaceus*), California oatgrass (*Danthonia californica*), Italian ryegrass (*Lolium multiflorum*), purple needlegrass (*Nassella pulchra*), and Idaho fescue (*Festuca idahoensis*); less abundant in these grasslands are annual and perennial forbs such as filaree (*Erodium botrys*), true clovers (*Trifolium* spp.), and dwarf plantain (*Plantago erecta*). These species, with the exception of the dwarf plantain, are not required by the Bay checkerspot butterfly, but merely are provided here as an example of species commonly found in California grasslands;

<u>PBF 2</u>: The presence of the primary larval host plant, dwarf plantain (*Plantago erecta*), and at least one of the secondary host plants, purple owl's-clover (*Castilleja densiflora*) or exserted paintbrush (*Castilleja exserta*), are required for reproduction, feeding, and larval development;

<u>PBF 3</u>: The presence of adult nectar sources for feeding. Common nectar sources include desert parsley (*Lomatium* spp.), California goldfields (*Lasthenia californica*), tidy-tips (*Layia platyglossa*), sea

muilla (*Muilla maritima*), scytheleaf onion (*Allium falcifolium*), flase babystars (*Linanthus androsaceus*), and intermediate fiddleneck (*Amsinckia intermedia*);

PBF 4: Soils derived from serpentinite ultramafic rock (Montara, Climara, Henneke, Hentine, and Obispo soil series) or similar soils (Inks, Candlestick, Los Gatos, Fagan, and Barnabe soil series) that provide areas with fewer aggressive, nonnative plant species for larval host plant and adult nectar plant survival and reproduction; and

PBF 5: The presence of stable holes and cracks in the soil, and surface rock outcrops that provide shelter for the larval stage of the Bay checkerspot butterfly during summer diapause.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the Bay checkerspot butterfly occurs within the Action Area.

Callippe Silverspot Butterfly

The callippe silverspot butterfly occurs or has the potential to occur within the Action Area in San Mateo, Solano, Sonoma and Alameda Counties. The CNDDB (2018) lists 12 occurrences for the callippe silverspot butterfly. The species currently is known from isolated populations occurring in grasslands with its host plant in northern San Mateo County (San Bruno Mountain.), Solano County (Cordelia Hills), Sonoma County (Sears Point), Alameda County (hills near Pleasanton, watershed east of Calaveras Reservoir) (Terry, J, pers. comm., 2018). The habitat for the callippe silverspot butterfly is native grasslands and associated habitats in the San Francisco Bay area (Service 1997). These grasslands are associated with deep soils that have established grass cover and contain the larval host plant *Viola pedunculata* (Service 2009b).

The primary threats to the callippe silverspot butterfly include habitat loss and fragmentation resulting from urbanization throughout the greater San Francisco Bay area. As habitat has been lost and fragmented, the small populations have become increasingly isolated, eventually affecting dispersal and genetic exchange between populations (Service 1997). Invasion of non-native plants and shrubs is another significant threat to the callippe silverspot butterfly. Non-native species have displaced grassland habitats; invasive grasses and herbs displace callippe silverspot butterfly host plants and food plants, or make them difficult to access. Trampling by increased human activity also threatens this species. Hikers, bicyclists, and off-road vehicles can kill larvae. These activities may also harm food plant, indirectly decreasing larval survival (Service 2009b).

There is no recovery plan for this species. The Action Area includes all occurrences. While there have been continued losses of callippe silverspot butterfly habitat throughout its range, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the range-wide status, please refer to the Callippe Silverspot Butterfly *(Speyeria callippe callippe)* 5-Year Review: Summary and Evaluation (Service 2009b). No change in the species' listing status was recommended in this species' 5-year review.

Critical Habitat

No critical habitat has been designated for the callippe silverspot butterfly.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the callippe silverspot butterfly occurs within the Action Area.

Myrtle's Silverspot Butterfly

The Myrtle's silverspot butterfly occurs or has the potential to occur within the Action Area in Marin and Sonoma Counties. The CNDDB (2018) lists 17 occurrences for the Myrtle's silverspot butterfly. The species currently is known to occur up to 3 miles inland in Marin and Sonoma Counties: from Point Reyes in Marin County and north to the mouth of Russian River in Jenner in Sonoma County (Terry, J., pers. comm. 2018). The Myrtle's silverspot butterfly occurs in association with coastal dunes, coastal scrub and coastal prairies that are protected from winds (Launer *et al.* 1992). One of the critical factors in the distribution of the Myrtle's silverspot butterfly is the presence of its host plant, the western dog violet (*Viola adunca*) (Service 2009c).

Development is the primary threat to the Myrtle's silverspot butterfly, and development of the remaining habitat for this species will remain a threat until sufficient habitat for the species is acquired and protected. Increased human activity is also threat; foot traffic, cyclists and off-road vehicles pose hazards to the larval stages of the butterfly by inadvertently trampling their host plant (Service 1992).

The Recovery Plan for the Myrtle's silverspot butterfly does not identify recovery units; however, it does state that for downlisting, habitat in northwestern Marin and southwestern Sonoma counties must be protected in perpetuity (Service 1998a). The Action Area includes these key recovery areas and all occurrences. While there have been continued losses of Myrtle's silverspot butterfly habitat throughout its range, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the range-wide status, please refer to the Myrtle's Silverspot Butterfly *(Speyeria zerene myrtleae)* 5-Year Review: Summary and Evaluation (Service 2009c). No change in the species' listing status was recommended in this species' 5-year review.

Critical Habitat

Critical habitat has not been designated for the Myrtle's silverspot butterfly.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that the Myrtle's silverspot butterfly occurs within the Action Area.

Vernal Pool Branchiopods

In California, primary vernal pool habitat forms a discontinuous ring around the margins of the California Central Valley. The majority of pools occur on the older alluvial terraces along the eastern margin of the valley, but vernal pool habitat also occurs on high terraces on the eastern sides of the inner Coast Ranges and an additional band through the valley center. Vernal pool complexes are typified by a range of aquatic habitats, although some locales have more pools of one type (e.g., small, shallow, and short-lived, or playa-type pools, etc.) than other areas (Holland 1998a). Several counties (Glenn, Colusa, and Yolo) have little potential habitat for the branchiopods because they lack substantial areas of hardpan soils and have little flat land that is not in agriculture. Tehama, Yuba, Solano, and Madera counties contain the highest-density areas of vernal pools, while

Sacramento, Merced, and Fresno counties have many areas with high-density pools. Of the 20 Central Valley counties, Yuba, Placer, Sacramento, and Madera counties have the highest average densities (Holland 1978). These areas of high-density habitat likely are especially important to the population dynamics of vernal pool branchiopods such as the vernal pool fairy. Up to 85 percent of vernal pools may lack large vernal pool branchiopods (Helm 1998). Holland (1998) estimated that extant vernal pool landscapes throughout the Central Valley had fallen below 1,000,000 acres, or roughly one quarter of the valley's estimated original vernal pool habitat.

In California's Central Coast Ranges, vernal pool habitats are more thinly distributed than in the Central Valley, with only 42,488 acres of vernal pool habitat occurring out of a total of 9,574,099 acres in the region (Holland 2003). Habitat patches are smaller and more isolated; however, loss of vernal pool habitat in this area also appears to be accelerating. Holland (2003) recorded a 2-3 percent annual loss rate between 1994 and 2000, and almost a 12 percent loss between 2000 and 2001, with the loss often due to agricultural conversion (to hay or vineyards).

Vernal Pool Fairy Shrimp

The vernal pool fairy shrimp occurs or has the potential to occur within the Action Area where its vernal pool habitat occurs. 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 2007a). 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 Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005a) identifies 45 core recovery areas in 13 vernal pool regions for the vernal pool fairy shrimp: Carrizo Region (4 core areas), Central Coast Region (2 core areas), Klamath Mountain Region (3 core areas), Lake-Napa Region (1 core area), Livermore Region (1 core area), Northeast Sacramento (4 core areas), Northwest Sacramento (3 core areas), San Joaquin Region (2 core areas), Santa Barbara Region(2 core areas), Solano-Colusa Region (3 core areas), Southeast Sacramento (4 core areas), Southern Sierra Foothills (6 core areas), and Western Riverside Region (3 core areas). The vernal pool fairy shrimp is presumed to occur in at least one pool in each of these core areas (Service 2005a). The Action Area includes all of these 45 core areas and all occurrences. While there have been continued losses of vernal pool fairy shrimp habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Vernal Pool Fairy Shrimp *(Branchinecta lynchi)* 5-Year Review: Summary and Evaluation (Service 2007a). No change in the species' listing status was recommended in this species' 5-year review.

Vernal Pool Tadpole Shrimp

The vernal pool tadpole shrimp occurs or has the potential to occur within the Action Area within its patchy distribution across the California Central Valley, from Shasta County southward to northwestern Tulare County, with isolated occurrences in Alameda and Contra Costa Counties. The CNDDB (2018) lists 324 occurrences for the vernal pool tadpole shrimp. The vernal pool tadpole shrimp occurs 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 Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005d) identifies 24 core recovery areas found within seven vernal pool regions for this species: Central Coast Region (1 core area), Northeast Sacramento Region (5 core areas), Northwest Sacramento Region (2 core areas), San Joaquin Region (2 core areas), Solano-Colusa Region (5 core areas), Southeast Sacramento Region (4 core areas) and Southern Sierra Foothills Region (5 core areas). The Action Area includes all of these 24 core areas. While there have been continued losses of vernal pool tadpole shrimp habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Vernal Pool Tadpole Shrimp *(Lepidurus packardi)* 5-Year Review: Summary and Evaluation (Service 2007b). No change in the species' listing status was recommended in this species' 5-year review.

Conservancy Fairy Shrimp

The conservancy fairy shrimp occurs or has the potential to occur within the Action Area in Butte, Glenn, Tehama, Merced, Placer, Solano, Stanislaus, Yolo Counties, and one disjunct population on the Central Coast of Ventura County (Service 2012b). The CNDDB (2018) lists 43 occurrences for the conservancy fairy shrimp. The majority of sites inhabited by this species are relatively large and turbid vernal pools called playa pools (Helm 1998, Eriksen and Belk 1999, Vollmar 2002, Service 2005a). 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).

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005e) 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). The Action Area includes all occurrences and core recovery areas. While there have been continued losses of conservancy fairy shrimp habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Conservancy Fairy Shrimp *(Branchinecta conservatio)* 5-year Review: Summary and Evaluation (Service 2012b). No change in the species' listing status was recommended in this species' 5-year review.

Longhorn Fairy Shrimp

The longhorn fairy shrimp occurs or has the potential to occur within the Action Area in Alameda, Contra Costa, Fresno, Merced and San Luis Obispo Counties (Service 2012a). The CNDDB (2018) lists 20 occurrences for this species. The longhorn fairy shrimp is known only from a few localities, and these sites contain very different types of vernal pool habitats. Longhorn fairy shrimp in the Livermore Vernal Pool Region in Contra Costa and Alameda Counties live in small, clear, sandstone outcrop vernal pools that are sometimes no larger than 3.3 feet (1 m) in diameter, have a pH near neutral, and very low alkalinity and conductivity. Water temperatures in these vernal pools have been measured between 50 and 64 degrees Fahrenheit (Helm 1998). In the San Joaquin and Carrizo Vernal Pool Regions, the longhorn fairy shrimp occur in clear to turbid, grassland pools that may be as large as 203.4 feet (61.7 m) in diameter. Water temperatures in these grassland vernal pools are also warmer, between 50 to 82 degrees Fahrenheit (Helm 1998, Eriksen and Belk 1999).

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005e) identifies five core recovery areas found within three vernal pool regions for the longhorn fairy shrimp: North Carrizo Plain and South Carrizo Plain (Carrizo Region), Altamont Hills (Livermore Region), and Grasslands Ecological Area (San Joaquin Region). The Action Area includes all occurrences and core areas. While there have been continued losses of longhorn fairy shrimp habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Longhorn Fairy Shrimp *(Branchinecta longiantenna)* 5-year Review: Summary and Evaluation (Service 2012a). No change in the species' listing status was recommended in this species' 5-year review.

Threats to Vernal Pool Branchiopods

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.

Critical Habitat

The Service designated critical habitat collectively for four vernal pool branchiopods and 11 vernal pool plants in 34 counties in California and one county in southern Oregon on August 6, 2003 (Service 2003b) and a revised designation of critical habitat of approximately 858,846 acres was published on August 11, 2005 (Service 2005a).

The PBFs of critical habitat for the four vernal pool branchiopods are the habitat components that provide:

PBF 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;

PBF 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;
- 23 days for longhorn fairy shrimp;
- 19 days for conservancy fairy shrimp;
- 41 days for vernal pool tadpole 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;

PBF 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

PBF 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.

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 the following units and acres within the Action Area for these four vernal pool branchiopods species.

- 597,821 acres within 32 critical habitat units for the vernal pool fairy shrimp in Jackson County, Oregon, and Alameda, Amador, Contra Costa, Fresno, Kings, Mariposa, Monterey, Napa, Placer, San Benito, San Joaquin, San Luis Obispo, Santa Barbara, Shasta, Stanislaus, Tehama, Tulare, Ventura, and Yuba counties, California.

- 13,557 acres within three critical habitat units for the longhorn fairy shrimp in Alameda, Contra Costa, Merced, and San Luis Obispo counties, California.

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

- 228,785 acres within 16 critical habitat units for the vernal pool tadpole shrimp in Alameda, Amador, Butte, Colusa, Fresno, Kings, Madera, Mariposa, Merced, Sacramento, Shasta, Solano, Stanislaus, Tehama, Tulare, Yolo, and Yuba Counties, California.

Based on the documented presence of these four vernal pool branchiopod species in the Action Area, and the biology and ecology of these species, the Service has determined that vernal pool fairy shrimp, vernal pool tadpole shrimp, conservancy fairy shrimp and longhorn fairy shrimp occur within the Action Area.

Sacramento Orcutt Grass

The Sacramento Orcutt grass occurs or has the potential to occur within the Action Area in Sacramento County. The CNDDB (2018) lists 12 occurrences for the species. Sacramento Orcutt grass is an annual grass that occurs in vernal pools on high terrace sites in a narrow zone of remnant depositional stream terraces at the base of the Sierra Nevada foothills (Stone *et al.* 1988).

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005e), which includes the Sacramento Orcutt grass, identifies three core areas for the species' recovery: Cosumnes/Rancho Seco, Mather and Phoenix Field and Park, all within the Southeast Sacramento vernal pool region. The Action Area includes all occurrences and core areas. While there have been continued losses of Sacramento Orcutt grass habitat throughout the various recovery units, to date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. For the most recent comprehensive assessment of the species' range-wide status, please refer to the Sacramento Orcutt Grass *(Orcuttia viscida)* 5-Year Review: Summary and Evaluation (Service 2008c). No change in the species' listing status was recommended in this species' 5-year review.

Critical Habitat

The Service designated critical habitat collectively for four vernal pool branchiopods and 11 vernal pool plants in 34 counties in California and one county in southern Oregon on August 6, 2003 (Service 2003b) and a revised designation of critical habitat of approximately 858,846 acres was published on August 11, 2005 (Service 2005a).

The PBFs of critical habitat for the Sacramento Orcutt grass are habitat components that provide:

PBF 1: Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously, or intermittently, flowing surface water in the depressional features including swales connecting the pools and providing for dispersal and promoting hydroperiods of adequate length in the pools;

PBF 2: Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species typically exclude both native and nonnative upland plant species in all but the driest years. 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.

On February 10, 2006, the Service (2006a) published a final rule providing species-specific unit descriptions and maps identifying the critical habitat for each individual species. The rule designated 33,273 acres for the Sacramento Orcutt grass within three critical habitat units in Amador and Sacramento Counties.

Threats

Habitat loss and fragmentation is the largest threat to the survival and recovery of the vernal pool species. Habitat loss and fragmentation generally is a result of urbanization, agricultural conversion, and mining. Habitat loss also 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. An additional threat to vernal pool plants is the decline of essential pollinators due to habitat fragmentation and the loss of the upland habitat that supports pollinator species. Habitat loss and degradation interferes with reproduction and dispersal of pollinators. It is likely that many of these pollinators require the uplands surrounding vernal pools for completion of their life cycle. For insect pollinated plants, the reduction of available habitat for pollinators could decrease pollinator populations, which could reduce reproductive success of the plants.

Based on occurrence records, the presence of suitable habitat, and the biology and ecology of the species, the Service has determined that Sacramento Orcutt grass occurs within the Action Area.

Effects of the Proposed Action

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 programmatic biological opinion 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 programmatic biological opinion, 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; discharge of contaminants into soil and water; 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 to 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 Disaster, Mitigation, and Preparedness Programs are limited to repair and replacement of existing facilities and natural areas, rather than newer 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.

<u>Effects to all covered Species</u>

The following effects are applicable to both aquatic and terrestrial covered species.

Loss and Disturbance of Habitat

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. Examples of activities that may temporarily or permanently disturb or remove aquatic or terrestrial habitats can be found in the Description of the Proposed Programmatic Actions section of this programmatic biological opinion.

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 one 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.

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 encounters with individual 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. For listed butterflies, appropriate buffers around host plants and hilltop breeding areas as well as seasonal limitations for breeding areas will also reduce or eliminate direct effects. This is also the case with species that use small mammal burrows as refugia, such as California tiger salamanders and California red-legged frogs. The *Conservation Measures* section of this opinion provides a full description of these general and species-specific measures.

Riparian Habitat Removal or Degradation

Listed species inhabiting riparian and aquatic habitats, including California red-legged frog, giant garter snake, California freshwater shrimp, valley elderberry longhorn beetle, and least Bell's vireo, may be directly or indirectly affected by riparian habitat removal and/or degradation by activities such as the following.

- Vegetation management
- Debris removal
- Repairing, realigning, or otherwise modifying roads, trails, utilities, and rail lines
- Repairing, replacing or installing culverts
- Repairing, stabilizing, or armoring embankments
- Creating, widening, clearing, or dredging a waterway
- Constructing or modifying a water crossing
- Constructing or modifying other flood control structures

Habitat fragmentation occurs when areas of connected habitat are disjoined by the removal or reduction of habitat. Therefore, the removal or reduction of riparian habitat has the consequence of fragmenting riparian habitats which have the added consequences of 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.

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 are then vulnerable to local extinction due to stochastic environmental and human-induced events. In addition to fragmentation, the removal of riparian cover can also have negative effects on reproductive success of both the California red-legged frog and the California tiger salamander by allowing more solar radiation to heat pools and slow moving streams. Since the California red-legged frog and the California tiger salamander egg masses can tolerate a maximum water temperature of 70 ºF and 66 ºF, respectively, incremental increases to water temperatures will reduce reproductive success of both species.

The valley elderberry longhorn beetle occurs throughout the Central Valley in metapopulations and is dependent on a contiguous riparian habitat making is susceptible to habitat fragmentation. The valley elderberry longhorn beetle has a limited dispersal ability adding to their vulnerability of fragmented habitats limiting their opportunity to successfully colonize unoccupied habitat. As a consequence, isolated subpopulations are more vulnerable to stochastic events that can reduce or eliminate isolated populations. Loss of elderberry shrubs associated with riparian habitat will reduce available habitat for the valley elderberry longhorn beetle and may result in take if occupied shrubs are damaged or removed (Service 2017c).

The long-term or permanent removal of riparian vegetation may reduce in-stream habitat quality, riparian habitat complexity, and erosion and sedimentation in cleared riparian areas. Adverse effects may occur to California freshwater shrimp, which depend on complex riparian habitat that includes fine root systems, root wads and overhanging vegetation and woody debris. Loss of riparian vegetation adversely affects the ability of shrimp to disperse and affects turbidity and water temperatures in the creeks and streams.

For the least Bell's vireo, the permanent removal of riparian vegetation could result in reduced quality, quantity, and complexity of habitat within and adjacent to project areas, which can reduce the suitability of least Bell's vireo nesting areas. Across the landscape, tree and understory removal within suitable foraging, dispersal, roosting, or nesting habitat could indirectly affect least Bell's vireo if tree species composition, structural diversity, or habitat density is significantly or permanently altered. Actions that remove or degrade the quality of riparian habitats may adversely affect their reproductive success by increasing their vulnerability of predation to cowbird parasitism and predation by scrub-jays, hawks, raccoons, and coyotes.

Implementing the conservation measure requiring revegetation of stream and riverbanks with native species when proposed projects remove riparian vegetation during construction activities will minimize these effects to covered species. Removed vegetation will be replaced with in-kind species at a 3:1 ratio with an 80 percent planting survival five years after planting. Conservation measures to clearly delineate and minimize the project footprint will minimize adverse effects to riparian habitats and associated covered species. Requiring Service-approved biological monitors will minimize direct injury and harm to listed species by identifying their presence and allowing them to move out of harm's way. The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

Hazardous Materials Spills

Spills of hazardous materials may directly or indirectly affect all of the covered species. Chemical contamination of soil or water sources could occur from equipment leaks (e.g., diesel fuel, oil, hydraulic fluids, and antifreeze), refueling spills, or an accidental spill during project implementation. Accidental spills of hazardous materials can degrade water quality or upland habitat to a degree where species are adversely affected or killed by chemicals interfering with physiological pathways. For example, some hazardous chemicals have been shown to mimic estrogen in vertebrates, which has been hypothesized as a leading mechanism in amphibian decline (Jennings 1996).

The implementation of proposed conservation measures will significantly reduce these hazards. Subapplicants will prepare a Spill Prevention and Pollution Control Plan to minimize the risk of spilled hazardous materials and other construction debris from entering soils and waterways. Equipment will be inspected daily for fuel leaks, any fuel leaks discovered will be cleaned up immediately, wet cement and uncured concrete will not be allowed to enter waterways, stockpiled soils will be covered to prevent erosion, and all staging and hazardous material storage areas will be placed in upland areas that are paved, graveled, or otherwise non-erodible and away from water bodies or sensitive habitat. For proposed projects involving work over water, measures will be taken to ensure that construction debris is contained and does not fall into the water. Implementing these measures will minimize the effects of project-related disturbance on covered species and their habitat. The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

Invasive Species and Pathogens

The introduction of pathogens, invasive plant and animal species could adversely affect any of the covered species. California red-legged frogs and California tiger salamanders are particularly vulnerable to introduced pathogens. Invasive species and pathogens are often introduced to uninvaded sites through construction soil and debris transported on construction equipment. Invasive species and pathogens also may be transferred via construction materials or on the clothing or boots of those working at the site. During in-water work, invasive species and pathogens may be introduced to a water body through ballast or bilge water discharge if vessels are inadequately cleaned prior to transfer between invaded and uninvaded sites. Pathogens may be introduced through nursery plants used in revegetation and restoration.

Although not all non-native species have negative effects on the covered species, those that outcompete covered species are considered undesirable for their continued persistence. Therefore, introductions of invasive species can increase interspecific completion between listed species and non-native, invasive species. Invasive mosquitofish that are commonly stocked to help combat mosquito larvae have been shown to prefer fairy shrimp species over mosquito larvae (Leyse et al., 2004). Therefore, the introduction of mosquitofish into vernal pool complexes could lead to increased predation of vernal pool fairy shrimp, conservancy fairy shrimp, and longhorn fairy shrimp.

Invasive species can directly injure or kill covered species, or indirectly harm covered species by reducing prey abundance or detrimentally affect aquatic and riparian vegetation. Invasive plants species may also out-compete and crowd out covered plant species, as well as the host plants for listed butterflies.

Chytrid fungi are diverse, abundant, and widespread in aquatic ecosystems. They are known to infect a diverse assemblage of hosts across the tree of life. Although evidence is lacking for their effects on California red-legged frogs and California tiger salamander, some observations have indicated that both species tend to shed their skin at a much higher rate when infected in laboratory settings, which requires the use of additional energy (Service 2016 & 2017b). This allocation of resources to fend off chytrid infection could lead to decreased fitness if infected in the wild. The accidental introduction of chytrid fungi into an area could have significant adverse effects to the California red-legged frog and California tiger salamander. The introduction of non-native species into an ecosystem has the added possibility of introducing novel pathogens that could negatively affect species.

Implementing the proposed conservation measures will significantly reduce the introduction or spread of invasive species and pathogens. Subapplicants will properly clean construction equipment, clothing, waders and boots prior to moving between work sites, particularly if the prior work site is known or suspected to contain invasive species or pathogens. Subapplicants will take all precautions to prevent the introduction of amphibian disease pathogens if California red-legged frogs or California tiger salamanders must be handled or relocated. All persons entering the action area to handle amphibians after working in other aquatic habitats will disinfect all equipment and clothing. The Subapplicants 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). The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

Beneficial Effects

Beneficial effects include relocating facilities away from sensitive habitats, restoring native vegetation, removing invasive species, improving water quality and hydrology, and vegetation management. Stabilizing eroding banks, reducing sedimentation and turbidity, and replacing or removing structures that form partial or complete barriers with structures that enhance movement corridors or habitat connectivity also provide long-term beneficial effects for covered species. Existing structures may be modified or replaced in ways that provide shade and cover, reduce refugia for predators, replace hardened shorelines with living shoreline structures, improve hydrologic function of stream channels, or increase porosity of previously impervious surfaces. For example, replacing an undersized, hanging culvert with an open bottom culvert may improve wildlife passage and allow better movement of substrate through the culvert. Wildfire risk-reduction activities may provide a beneficial effect to covered species by reducing the risk of large-scale catastrophic wildfires. Although the above mentioned scenarios can provide beneficial effects to covered species, it is important to note that these benefits can take months or years to be fully realized.

Effects to Aquatic Species

The following effects are primarily applicable to covered aquatic species, which include California red-legged frog, California tiger salamander, giant garter snake, California freshwater shrimp, tidewater goby and vernal pool species.

Erosion, Turbidity and Sedimentation

Increased erosion, turbidity, and sedimentation may affect aquatic species, particularly California red-legged frog and California tiger salamander eggs and larvae, California freshwater shrimp 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.

California freshwater shrimp may be adversely affected by in-stream work that causes high levels of siltation downstream. Although shrimp are usually able to survive in poor water quality conditions, excessive siltation could alter the quality of the habitat to the extent that use by individuals of the species is precluded. Siltation also could fill pools used by shrimp during summer low flows, reducing the extent or quality of shrimp habitat near the project area. Likewise, 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.

For most covered projects, implementing the proposed conservation measures and best management practices will likely reduce 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 programmatic biological opinion provides a full description of these general and species-specific measures.

Underwater Noise, Vibration and Sound Pressure

Pile driving, in-water drilling, cutting, or excavation can have short-term adverse effects on covered aquatic species such as the tidewater goby, California red-legged frog, and giant garter snake, 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 cause barotrauma to tidewater gobies. California red-legged frogs, California tiger salamanders and giant garter snakes may be more susceptible to injury and mortality from predation, desiccation and vehicular or foot traffic when project related noise and disturbance causes them to move away from sheltered habitat areas within a construction area.

Implementing the proposed conservation measures will minimize the effects of noise, vibration, and sound pressure. These include the use of work windows to avoid times that species such as the giant garter snake and California red-legged frog are most active, and using biological monitors to determine if animals are in the work area prior to ground disturbing activities. The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

Streambed, Bank and Shoreline Modification

Any replacement of natural or armored banks that provide refugia for California red-legged frogs or giant garter snakes with banks that provide no such refugia (e.g., concrete crib walls or sacked concrete) will result in permanent habitat and permanent adverse effects to the hydrology and habitat quality of the stream or estuary. These activities will result in the removal of emergent and riparian vegetation along banks or in the channel or wetland, resulting, for example, in the loss of cover needed for giant garter snake basking, foraging, or shelter. Removal of burrows along streambanks that giant garter snakes and California red-legged frogs could use as refugia may result in increased mortality due to predation. Work in streams that causes unusually high levels of siltation downstream can also adversely affect California freshwater shrimp.

Implementing the proposed conservation measures will minimize adverse effects to species and habitats caused by these project activities. These measures include avoiding placement of roads, staging areas, and other facilities adjacent to aquatic ecosystems as much as possible, and returning contours of the aquatic substrate environments, vegetation, and flows to pre-construction conditions or better after the completion of work. Implementing best management practices for erosion control and reducing the area to be disturbed to the minimum necessary should decrease the amount of sediment that is washed downstream as a result of project activities. Designing projects to minimize the creation of new impervious surfaces and using bioengineering and living shorelines techniques may also avoid or minimize adverse effects, where applicable. The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

Permanent Loss or Alteration of Vernal Pool Habitat

Vernal pool habitats support several covered species including four vernal pool branchiopods, California tiger salamanders and Sacramento Orcutt grass. Vernal pool habitats occupy areas with specific soil, geology and microtopography, making them highly susceptible to degradation from ground-disturbing activities. 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. Regrading 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 plants and 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 germination of plant seeds or 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 programmatic biological opinion 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 be indirectly affected.

In addition to the proposed general conservation measures, implementing the proposed species-specific conservation measures will minimize adverse effects. These proposed conservation measures include pre-construction surveys, construction monitoring by a Service-approved biologist, establishing construction work windows and activity buffers, and identifying and flagging sensitive areas. Mortality-related effects will be minimized by requiring work within 250 feet of vernal pool habitat be avoided to the maximum extent possible and, if it does occur, to happen only in the dry season and to have no permanent adverse effects to hydrology of the pools or the pool complex. The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

Effects from Dewatering, and Capture and Relocation of Aquatic Species

Proposed projects may involve dewatering and capture and relocation in waters occupied by covered species. Projects involving in-water work may require dewatering to properly install structures. In general, gravity conveyance via cofferdams and pipe systems is preferred when diversion of live-stream flows is necessary. However, in some cases pumps may be needed. If a pump is used, Subapplicants will screen the pump using an appropriate screen size for the target species to prevent entrainment, refer to species-specific conservation measures for appropriate screen sizes.

Dewatering, capture, and relocation of a covered species may reduce the magnitude of take and other effects when conducting in-water work. In such cases, implementing the proposed conservation measures will minimize the short-term adverse effects of such actions. Screening pump intakes as proposed in the species-specific conservation measures will reduce the probability that California red-legged frog tadpoles get caught in the inflow. Intakes will be completely screened with wire mesh no larger than indicated in the species-specific conservation measures and the intake will be placed within a perforated bucket or other method to attenuate suction to prevent species from entering the pump system. Temporary dewatering structures will be left in place for the minimum amount of time necessary for construction to allow covered aquatic species to return to the habitat.

Capture and relocation may cause mortality of a small number of individuals. Although the mortality rate associated with capture and relocation is typically low, relocated individuals are subject to stress and injury or death from the handling associated with relocation.

Temporary dewatering of creeks, ponds, or wetlands may harm or kill giant garter snake adults or young if they are not able to move on their own into nearby suitable habitat. Giant garter snakes that leave a construction area may move away from shelter and be more susceptible to injury and mortality from predation and vehicular or foot traffic. Displaced snakes may experience increased competition from animals in adjacent areas. Temporary dewatering of creeks, ponds, or wetlands may harm or kill California red-legged frog adults, larvae and eggs if they are not translocated to suitable habitat. Tadpoles may be injured or killed if entrained by pump or water diversion intakes. Chytrid fungi may be spread to California red-legged frogs and California tiger salamanders during capture and relocation if done without proper handling techniques and practices. Dewatering may strand, kill or injure California freshwater shrimp. They are small, inconspicuous and can take cover in areas that are difficult for a biologist to fully inspect. Shrimp may also be entrained by water pump systems and be injured or die. Injury and mortality may also occur to California freshwater shrimp during capture and relocation due to their fragile and delicate nature.

The short-term adverse effects of relocation will be minimized by implementing the proposed conservation measures. Only Service-approved biologists, using the most recent Service guidelines for relocation methods, will conduct capture and relocation. The Service-approved biologist will take precautions to prevent the introduction of amphibian diseases such as chytrid fungus 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 2003c). 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 the California tiger salamanders will also be handled and assessed according to the Restraint and Handling of Live Amphibians (USGS National Wildlife Health Center 2001). The Conservation Measures section of this programmatic biological opinion provides a full description of these general and species-specific measures.

<u>Effects to Terrestrial Species</u>

The following effects are primarily applicable to covered terrestrial species, which includes California red-legged frog, California tiger salamander, giant garter snake, Alameda whipsnake, Bay checkerspot butterfly, callippe silverspot butterfly, Myrtle's silverspot butterfly, and least Bell's vireo. These effects are also applicable to terrestrial habitats utilized by covered amphibians.

Habitat Disturbances, Noise, and Vibration

Noise and vibration associated with construction work may adversely affect many of the covered species. The movement and operation of heavy equipment during Subapplicants' proposed project activities, such as vibratory pile driving, impact pile driving, drilling, cutting, or excavation can have indirect effects on covered species by increasing ambient noise and vibration. Noise and vibration may affect covered species' breeding, foraging, and dispersal behavior. Noise and vibration from project activities may adversely affect covered birds, resulting in nest abandonment, fleeing, and temporary cessation of feeding or courtship behaviors. Additionally, this could impact future population sizes and connectivity of metapopulations. However, in many cases, these effects will be temporary in nature and likely limited to the construction period.

Work activities, including noise and vibration, may cause all terrestrial species to leave the work area. This disturbance may increase the likelihood for covered species vulnerability to predation or desiccation. Alameda whipsnakes and giant garter snakes may be harmed as a result of noise and vibration associated with construction work; 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. Displaced snakes also may experience increased competition from animals in adjacent areas. Nesting birds, such as the least Bell's vireo 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. 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.

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. Lighting structures provide raptor roosting sites which can lead to indirect effects to the giant garter snake by making them more vulnerable to predation when dispersing or basking.

The potential for disturbance and displacement of California red-legged frogs, California tiger salamanders and other covered species 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, of California red-legged frog and central California tiger salamander aquatic and upland habitat, as proposed. 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

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. The California tiger salamander is dependent on barrier-free landscapes for successful migration and dispersal. Therefore, these types of new barriers will reduce connectivity of the metapopulation, isolating subpopulations making them more vulnerable to stochastic events and less likely to be recolonized if extirpated.

Most proposed projects are either associated with existing infrastructure, expected to be small in scale, and/or localized; therefore, these effects are not expected to significantly change the baseline conditions present in the Action Areas. Instead, the effects of barriers to covered species migration and movement may be incrementally altered. In some instances, these alterations may improve the existing conditions and, in others, may decrease the ability for species to freely move between habitats. In general, partial or complete barriers may directly affect a species' breeding, foraging, and dispersal behaviors. Barriers may restrict movement, alter or restrict access to key habitats, or result in entrainment, injury, or mortality. Barriers may adversely affect species' dispersal behaviors, which are important to continue genetic mixing in a population. Loss or impairment of this function may result in population isolation or in population sinks or extirpation.

Implementation of proposed conservation measures will reduce the footprint associated with the work area, access road and staging areas within certain habitats, and areas commonly used as wildlife movement corridors.

Trampling, Crushing or Entrapment

Activities involving vegetation clearing, earth moving, pipeline installation, and other construction may adversely affect covered species through trampling, crushing or entrapment within natural and artificial structures. Natural structures may include mammal burrows, rubble piles, rock outcrops and root wads. Artificial structures include trenches, pipes, and construction equipment.

Direct effects associated with entrapment include injury and mortality. Excavation, movement or depositing of materials above natural structures may entrap covered species resulting in harm, injury, or mortality. Covered species such as California red-legged frogs, California tiger salamanders or Alameda whipsnakes may fall into an excavated trench and subsequently be buried or physically removed. These same covered species may occupy a pipe or construction equipment and be subject to take through direct handling and removal by construction personnel or biologist, movement of construction equipment or materials, and burial of construction material or pipe. Some of the effects associated entrapment may be temporary, such as physical handling and movement or falling into a trench, while other effects such as burial or movement of construction equipment and material may be permanent and lethal.

Direct effects on all covered species as a result of a proposed project includes injury or mortality from being crushed by equipment, maintenance materials, or worker foot traffic. Equipment, vehicles, and personnel working in open, upland grassland habitats may injure, or kill all life stages of covered butterfly species. Chrysalides, larvae, adults, and their larval host plants may be crushed or buried, and adults may be injured or killed by collisions with construction equipment. Species that take refuge in burrows such as California red-legged frog and California tiger salamander, and rocks and crevices such as the Alameda whipsnake, are highly vulnerable to crushing in their refugia or when they leave their refugia in response to disturbance.

These effects will be reduced by the proposed conservation measures, including minimizing and clearly demarcating the boundaries of activity areas, pre-construction surveys, and the presence of a Service-approved biologist during construction activities who will have the authority to halt work activities until the animal leaves the area on its own. Construction-related disturbance to butterfly host plants and breeding adults will be avoided and minimized through pre-construction surveys, biological monitors, and appropriate buffers around host plants and hilltop breeding areas as well as implementing seasonal limitations for work in breeding areas. Adverse effects to Alameda whipsnake will be minimized by avoiding rock outcroppings and scrub habitats, limiting the timing of activities to the summer and early fall to avoid disturbance to breeding and young, and removing vegetation by hand in areas with shrub vegetation.

Inadvertent entrapment will be avoided by covering all excavated, steep-walled trenches and holes greater than 6 inches at the end of each workday, or providing escape ramps. Relocating listed species out of harm's way, as proposed, may further minimize injury or mortality. The potential for uninformed workers to disturb, injure, or kill covered species will be greatly reduced by proposed education of workers as to the presence and protected status of species and the measures that will be implemented to protect it during work activities.

Critical Habitat

As described above, the Action Area encompasses the entire SFWO's jurisdiction and all critical habitat units within the SFWO's jurisdiction for the California red-legged frog, California tiger salamander (Central and Sonoma DPSs), Alameda whipsnake, tidewater goby, valley elderberry longhorn beetle, Bay checkerspot butterfly, vernal pool fairy shrimp, vernal pool tadpole fairy shrimp, conservancy fairy shrimp, longhorn fairy shrimp, and Sacramento Orcutt grass. 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.

California Red-Legged Frog
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.

California Tiger Salamander (Central California and Sonoma DPSs)
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.

Alameda Whipsnake
The Service anticipates that the activities associated with the proposed action could negatively affect PBF 1 (scrub/shrub community), PBF 2 (woodland/grassland community), and PBF 3 (rock outcrops) of the Alameda whipsnake 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 such as realigning roads around disaster areas could affect all three PBFs by permanently removing them and creating a paved road. As most of the activities are water related, the number of projects affecting Alameda whipsnake critical habitat will be small. 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 Alameda whipsnake.

Tidewater Goby

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.

Valley Elderberry Longhorn Beetle

The designated critical habitat for the valley elderberry longhorn beetle is limited to a small geographical area along the American River in Sacramento County, and the adverse effects from activities on critical habitat will be minimal. Activities associated with the proposed action could negatively affect critical habitat of the valley elderberry longhorn beetle within the Action Area. Given the location and size of the valley elderberry longhorn beetle critical habitat, the Service does not anticipate effects to critical habitat by Subapplicants. However, if activities occur in critical habitat they will only result in minor effects to habitat, and these activities, when implemented with both the general and species-specific conservation measures, will not prevent critical habitat from providing essential conservation values for the valley elderberry longhorn beetle.

Bay Checkerspot Butterfly

The Service anticipates that the activities associated with the proposed action could negatively affect PBF 1 (grass land community), PBF 2 (host plant), PBF 3 (nectar source), PBF 4 (soil type), and PBF 5 (shelter) of the Bay checkerspot butterfly 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. The repair of roads that run through critical habitat after a disaster could pose a risk to all PBFs. Depending on the timing of repairs, PBF 5 could be most affected during the summer months of the Bay checkerspot butterfly summer diapause. However, the projects footprint 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 Bay checkerspot butterfly.

Vernal Pool Branchiopods

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.

Sacramento Orcutt Grass

The Service anticipates that the activities associated with the proposed action could negatively affect PBF 1 (topographic features) and PBF 2 (depressional features) of the Sacramento Orcutt grass 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. Similar to affect to vernal pool branchiopod critical habitat. Sacramento Orcutt grass will be affected by project activities adjacent to critical habitat, which will affect both PBF 1 and PBF 2. 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 Sacramento Orcutt grass.

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.

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 programmatic biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The following actions may affect the species covered in this programmatic biological opinion 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 frequently are 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. However, due to the large area covered under this programmatic biological opinion, the Service is unable to provide specific information to determine cumulative effects.

Conclusion

After reviewing the current status of the 16 animal and one plant species covered by this programmatic biological opinion, the species' status and 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 Disaster, Mitigation, and Preparedness Program in California, as proposed, is not likely to jeopardize the continued existence of the following species:

California red-legged frog (*Rana draytonii*)
California tiger salamander (*Ambystoma californiense*)
- Central California DPS
- Sonoma DPS

Giant garter snake (*Thamnophis gigas*)
Alameda whipsnake (*Masticophis lateralis euryxanthus)*
Least bell's vireo (*Vireo bellii pusillus*)
Tidewater goby (*Eucyclogobius newberryi*)
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)
California freshwater shrimp (*Syncaris pacifica*)
Bay checkerspot butterfly (*Euphydryas editha bayensis*)
Callippe silverspot butterfly (*Speyeria callippe callippe*)
Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*)
Vernal pool fairy shrimp (*Branchinecta lynchi*)
Vernal pool tadpole shrimp (*Lepidurus packardi*)
Conservancy fairy shrimp (*Branchinecta conservatio*)
Longhorn fairy shrimp (*Branchinecta longiantenna*)
Sacramento Orcutt grass (*Orcuttia viscida*)

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 one 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 programmatic biological opinion, as described in the programmatic biological assessment.

Critical habitat is designated for 13 species covered by this programmatic biological opinion. After reviewing the current status of designated critical habitat for these species, the environmental baseline for the Action Area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that FEMA's Disaster, Mitigation, and Preparedness Program in California, as proposed, is not likely to destroy or adversely modify designated critical habitat for the following species:

California red-legged frog (*Rana draytonii*)
California tiger salamander (*Ambystoma californiense*)
- Central California DPS

- Sonoma DPS

Alameda whipsnake (*Masticophis lateralis euryxanthus*)
Least bell's vireo (*Vireo bellii pusillus*)
Tidewater goby (*Eucyclogobius newberryi*)
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)
Bay checkerspot butterfly (*Euphydryas editha bayensis*)
Vernal pool fairy shrimp (*Branchinecta lynchi*)
Vernal pool tadpole shrimp (*Lepidurus packardi*)
Conservancy fairy shrimp (*Branchinecta conservatio*)
Longhorn fairy shrimp (*Branchinecta longiantenna*)
Sacramento Orcutt grass (*Orcuttia viscida*)

The Service reached this conclusion because the project-related effects to the designated critical habitat for these 13 species, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding the function of the 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 13 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 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. Harass is defined by Service regulations at 50 CFR 17.3 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 behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part 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.

The measures described below are non-discretionary, and must be undertaken by FEMA so that they become binding conditions of any grant or permit issued to the applicant, 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 applicant 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. In order to monitor the impact of incidental take, FEMA 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)].

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally-listed endangered plants or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

Amount or Extent of Take

The Service is providing mechanisms to quantify when we consider take of the 16 covered animal species to be exceeded as a result of implementing the proposed project. We will use the following detections of injured or dead individuals per project site, total per year and total for the 5-year duration of this programmatic biological opinion. The detection of injured or dead individuals may indicate that species' utilization of habitat within the Action Area has changed over the lifetime of the project. By setting these thresholds, we have set an incidental take limit that is measureable, irrefutable and indicates that the species are being affected at a level where avoidance and minimization measures and project implementation need to be evaluated and possibly modified.

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

The Service is authorizing take incidental to the proposed action as the injury or fatality of no more than three juvenile or adult California red-legged frogs per site per year, no more than 30 juveniles or adult California red-legged frogs total for all sites per year, and no more than 150 juvenile or adult California red-legged frogs for the 5-year duration of this programmatic biological opinion.

Accordingly, the Service concludes that the incidental take (injury or fatality) 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. death or injury of more than three juvenile or adult California red-legged frogs per site per year;
2. death or injury of more than 30 juveniles or adults total for all sites per year; or
3. death or injury of more than 150 juveniles or adults, as detected during the 5-year duration of the programmatic biological opinion by the FEMA Subapplicants, biological monitors, or other personnel.

<u>Central California Tiger Salamander</u>

The Service is authorizing take incidental to the proposed action as the injury or fatality of no more than three juvenile or adult central California tiger salamanders per site per year, no more than 30 juvenile or adult central California tiger salamanders total for all sites per year, and no more than 150 juvenile or adult central California tiger salamanders for the 5-year duration of this programmatic biological opinion.

Accordingly, the Service concludes that the incidental take (injury or fatality) of central 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. death or injury of more than three juvenile or adult central California tiger salamanders per site per year;
2. death or injury of more than 30 juvenile or adult central California tiger salamanders total for all sites per year; or
3. death or injury of more than 150 juvenile or adult central California tiger salamanders during the 5-year duration of the programmatic biological opinion, as detected by the FEMA Subapplicants, biological monitors, or other personnel.

Sonoma California Tiger Salamander

The Service is authorizing take incidental to the proposed action as the injury or fatality of no more than one juvenile or adult Sonoma California tiger salamander per site per year, no more than 15 juvenile or adult Sonoma California tiger salamanders total for all sites per year, and no more than 75 juvenile or adult Sonoma California tiger salamanders for the 5-year duration of this programmatic biological opinion.

Accordingly, the Service concludes that the incidental take (injury or fatality) of Sonoma 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. death or injury of more than one juvenile or adult Sonoma California tiger salamander per site per year;
2. death or injury of more than 15 juveniles or adult Sonoma California tiger salamanders total for all sites per year; or
3. death or injury of more than 75 juvenile or adult Sonoma California tiger salamanders during the 5-year duration of the programmatic biological opinion, as detected by the FEMA Subapplicants, biological monitors, or other personnel.

Giant Garter Snake

The Service is authorizing take incidental to the proposed action as the injury or fatality of no more than three juvenile or adult giant garter snakes per site per year, no more than 30 juvenile or adult giant garter snakes total for all sites per year, and no more than 150 juvenile or adult giant garter snakes for the 5-year duration of this programmatic biological opinion.

Accordingly, the Service concludes that the incidental take (injury or fatality) of giant garter snakes 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. death or injury of more than three juvenile or adult giant garter snake per site per year;
2. death or injury of more than 15 juvenile or adult giant garter snakes total for all sites per year; or
3. death or injury of more than 75 juvenile or adult giant garter snakes during the 5-year duration of the programmatic biological opinion, as detected by the FEMA Subapplicants, biological monitors, or other personnel.

Least Bell's Vireo

The Service anticipates that incidental take of the least Bell's vireo associated with FEMA's proposed action will be difficult to detect or quantify because the species will be difficult, if not impossible, to detect at any given project site. Providing a meaningful number for incidental take is difficult because a surveyor can only count what they see. Least Bell's vireo are small, secretive, and occur in habitats that make detection difficult, thereby making them nearly impossible to locate during pre-activity survey efforts. Under such conditions, finding a dead or injured individual vireo is unlikely within a project activity area, or mortality may be masked by seasonal fluctuations in numbers and migration. In addition, in most cases there have been no prior formal surveys in areas where projects are likely to occur. There is a risk of harm, injury and mortality as a result of the proposed activities and the permanent and temporary loss or degradation of suitable habitat; however, proper implementation of general and species-specific conservation measures should be effective in preventing incidental take due to harm, injury, or mortality. If a single individual is killed or injured, there is no means of equating one dead or injured animal (assuming one was found) to a number of dead or injured animals not observed.

Since we cannot estimate the number of individual least Bell's vireo 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 least Bell's vireo inhabiting individual project footprints within the Action Area will be subject to incidental take in the form of non-lethal harm in terms of habitat only. No other forms of take are authorized. The Service anticipates and is authorizing the take of not more than one acre of actual habitat at any given project site that is less than 20 acres or no more than five percent of habitat at a particular site that is 20 acres or greater. This five percent at a particular site cannot represent more than five percent of the entire range of a covered species, for the five-year term of the programmatic biological opinion.

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 1 acre of actual habitat at any given project site that is less than 20 acres is taken;
2. more than 5 percent of habitat at a particular site that is 20 acres or greater is taken; or
3. if this 5 percent at a particular site represents more than 5 percent of the entire range of a covered species is taken, for the 5-year term of the programmatic biological opinion.

Valley Elderberry Longhorn Beetle

The Service anticipates incidental take of the valley elderberry longhorn beetle will be difficult to detect or quantify. The cryptic nature of this species and their relatively small body size make finding a dead specimen unlikely. The species' occurrences within its habitat make them difficult to detect. Due to the difficulty in quantifying the number of dead or injured individual beetles that will be taken as a result of the proposed action, the Service is quantifying take incidental to the proposed action as the number of elderberry shrubs with stems one inch or greater in diameter at ground level (VELB habitat) that may become unsuitable for valley elderberry long horn beetles due to direct and indirect effects as a result of the proposed project. Therefore, the Service anticipates that all valley elderberry longhorn beetles inhabiting elderberry shrubs containing stems 1-inch or greater in diameter at ground level within individual project action areas will be harmed or killed as a result of the proposed action. The Service is not further quantifying take (injury or fatality) of actual individual beetles or their larvae incidental to the proposed action.

Since we cannot estimate the number of individual valley elderberry longhorn beetles 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 valley elderberry longhorn beetles inhabiting individual project footprints within the Action Area will be subject to incidental take in the form of non-lethal harm and harassment. The Service anticipates and is authorizing the take of not more than one acre of actual habitat at any given project site that is less than 20 acres or no more than five percent of habitat at a particular site that is 20 acres or greater. This five percent at a particular site cannot represent more than five percent of the entire range of a covered species, for the five-year term of the programmatic biological opinion.

Accordingly, the Service concludes that the incidental take of valley elderberry longhorn beetle 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 1 acre of actual habitat at any given project site that is less than 20 acres is taken;
2. more than 5 percent of habitat at a particular site that is 20 acres or greater is taken; or
3. if this 5 percent at a particular site represents more than 5 percent of the entire range of a covered species is taken, for the 5-year term of the programmatic biological opinion.

<u>California Freshwater Shrimp</u>

The Service is authorizing take incidental to the proposed action as the injury or fatality of no more than two individual California freshwater shrimp if less than 20 are captured or no more that 5 percent of total individuals captured if more than 20 shrimp are captured per year, for the 5-year duration of this programmatic biological opinion.

Accordingly, the Service concludes that the incidental take (injury or fatality) of California freshwater shrimp 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. death or injury of more than two individual California freshwater shrimp per site if less than 20 are captured; or
2. death or injury of more that 5 percent of total individuals captured per site if more than 20 shrimp are captured per year, for the 5-year duration of the programmatic, as detected by the FEMA Subapplicants, biological monitors, or other personnel.

<u>Tidewater Goby</u>

The Service anticipates that take of the tidewater goby may occur as a result of the proposed projects in and around tidewater goby habitat, but it will be difficult to detect due to the species population dynamics, 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 and the number of occupied localities and locations varies with seasonal and stochastic events. The Service is authorizing take incidental to the proposed action in the form of capture and relocation and take incidental to the proposed project actions in the form of death or injury of up to five percent of individuals captured and relocated per site per year, 10 percent of the estimated population as a result of project activities per site per year, and up to five percent of the estimated populations as a result of all projects per year and for the 5-year duration of the programmatic biological opinion.

Accordingly, the Service concludes that the incidental take (injury or fatality) 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. death or injury of up to 5 percent captured and relocated individuals per site per year;
2. death or injury of up to 10 percent of the estimated population as a result of project activities per site per year; and
3. death or injury of up to 5 percent of the estimated populations as a result of all projects per year and for the 5-year duration of the programmatic biological opinion.

Bay Checkerspot Butterfly, Myrtle's Blue Butterfly, Callippe Silverspot Butterfly

The Service anticipates that incidental take of the Bay checkerspot butterfly, Myrtle's silverspot butterfly and Callippe silverspot butterfly (three butterfly species) will be difficult to detect because most take will likely occur to larvae and chrysalis pupae that are on host plants, lying on the ground or underneath a plant. The finding of a damaged or crushed individual larva or chrysalis is unlikely because of its relatively small size. Adults may be killed by mechanized equipment while flying through the project area; loss of individuals of these three butterfly species also may be difficult to quantify due to their small size. However, while small, these adults are more likely to be detected than larvae or chrysalises. The Service anticipates and is authorizing a maximum of two adults of each of these three butterfly species per site per year and no more than 30 adults of each of these three butterfly species total for all sites for the 5-year duration of this programmatic biological opinion.

Accordingly, the Service concludes that the incidental take (injury or fatality) of the Bay checkerspot butterfly, Myrtle's silverspot butterfly and Callippe silverspot 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. Death or injury of more than two individual adults of each of these three butterfly species per site per year or
2. Death or injury of more than 30 individual adults of each of these three butterfly species, for the 5-year duration of this programmatic biological opinion, as detected by the FEMA Subapplicants, biological monitors, or other personnel.

Alameda Whipsnake

The Service anticipates and is authorizing take incidental to the proposed action as the injury or fatality of no more than one juvenile or adult Alameda whipsnake per year and no more than five juvenile or adult Alameda whipsnakes during the 5-year duration of this programmatic biological opinion.

Accordingly, the Service concludes that the incidental take of Alameda whipsnake 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 five dead or injured juvenile or adult individual Alameda whipsnakes total for all sites per year; or
2. more than 25 dead or injured juvenile or adult individual Alameda whipsnakes total for all sites during the 5-year duration of the programmatic biological opinion, as detected by the FEMA Subapplicants, biological monitors, or other personnel.

Vernal Pool Branchiopods

It is not meaningful to provide numbers for incidental take of individual conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, and longhorn fairy shrimp (collectively, vernal pool branchiopods) associated with this action because a surveyor only can count what they can see and there is much that they cannot see under the water and within the soil. Even in locations actually occupied by the species, it is possible for surveyors to miss adults, juveniles and eggs, particularly given the opportunistic and precipitation-driven life history of these species and the large size of the Action Area. All of these factors result in even the most experienced vernal pool branchiopod biologist being unable to show that any estimated take occurred or did not occur at the site. If a single individual vernal pool branchiopod has been killed or injured, there is no means of equating one dead or injured branchiopod (assuming one was found) to a number of dead or injured branchiopods not observed. Furthermore, the likelihood of detecting an injured or dead vernal pool branchiopod is extremely low due to their very small size and cryptic life history. Therefore, the Service is not quantifying take incidental to the proposed action as the injury or fatality in terms of individual animals. Incidental take for this species is provided only in terms of habitat, as described above.

Since we cannot estimate the number of individual vernal pool branchiopods 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 vernal pool branchiopods inhabiting individual project footprints within the Action Area will be subject to incidental take in the form of non-lethal harm and harassment. The Service anticipates and is authorizing the take of not more than 1 acre of actual habitat at any given project site that is less than 20 acres or no more than five percent of habitat at a particular site that is 20 acres or greater. This five percent at a particular site cannot represent more than five percent of the entire range of a covered species, for the five-year term of the programmatic biological opinion.

Accordingly, the Service concludes that the incidental take of vernal pool branchiopods 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 1 acre of actual habitat at any given project site that is less than 20 acres is taken;
2. more than 5 percent of habitat at a particular site that is 20 acres or greater is taken; or
3. if this 5 percent at a particular site represents more than 5 percent of the entire range of a covered species is taken, for the 5-year term of the programmatic biological opinion.

Upon implementation of the following reasonable and prudent measures, incidental take of these 17 animal species associated with FEMA's Disaster, Mitigation, and Preparedness Program in California, will become exempt from the prohibitions described in section 9 of the Act. No other forms of take are exempted under this programmatic biological opinion.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species covered by this programmatic biological opinion, or destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures

The Service has determined the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of these 16 species:

1. FEMA and their Subapplicants shall fully implement and adhere to all general avoidance and minimization measures and species-specific conservation measures, as described in the programmatic biological assessment and restated here in the Description of the Proposed Programmatic Actions section of this programmatic biological opinion. Further, this reasonable and prudent measure shall be supplemented by the terms and conditions below.

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 avoidance and minimization measures and species-specific conservation measures and their responsibility to implement them fully.

2. 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:

    a) Subapplicant and project name;
    b) Project location with map or GIS shape file;
    c) Covered species impacted;
    d) Estimated acres of covered species' habitat affected (acres, linear feet, etc.), as stated in the ESA Review Form;
    e) 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 programmatic biological opinion.
    f) The annual report will also include a summary of acres of habitat taken and individuals injured or killed from all previous years.
    g) 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:

i. Date the project was initiated and completed;
ii. Number of observed instances of injury or mortality of any covered species;
iii. Number of observations of live, uninjured individuals of any covered species;
iv. Pertinent information concerning the success of the project in meeting the conservation measures; and
v. An explanation of failure to meet such measures, if any.

3. 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.

4. FEMA or its Subapplicants shall immediately contact the Service's SFWO at (916) 414-6631 to report direct encounters between listed species and project workers and their equipment whereby incidental take in the form of harm, injury, or death occurs. If the encounter occurs after normal working hours, FEMA or its Subapplicants shall contact the SFWO at the earliest possible opportunity the next working day. When injured or killed individuals of the listed species are found, FEMA or its Subapplicants shall follow the steps outlined in the Salvage and Disposition of Individuals section below.

5. For those components of the action that will require the capture and relocation of any listed species, FEMA or its Subapplicant shall immediately SFWO at (916) 414-6631 to report the action. If capture and relocation need to occur after normal working hours, FEMA or its Subapplicant shall contact the SFWO at the earliest possible opportunity the next working day.

6. FEMA or its Subapplicants shall immediately contact the Service's SFWO at (916) 414-6631 to report any unauthorized take of federally-listed species occurs onsite, or if more than one (1) acre of habitat is adversely affected at a particular site as a result of implementation of the FEMA-funded action.

Salvage and Disposition of Individuals

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-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. The Service contact persons are Kellie Berry or Gerry Cobian at the SFWO at (916) 414-6631.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following action:

1. Sightings of any listed and sensitive species encountered during FEMA-funded activities should be reported to the California Natural Diversity DataBase (CNDDB), California

Department of Fish and Wildlife.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION—CLOSING STATEMENT

This concludes formal consultation on FEMA's Disaster, Mitigation, and Preparedness Programs in California. As provided in 50 CFR §402.16, reinitiation of formal consultation is required and shall be requested by the federal agency or by the Service where discretionary federal agency involvement or control over the action has been retained or is authorized by law and:

(a) If the amount or extent of taking specified in the incidental take statement is exceeded;
(b) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
(c) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or
(d) If a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any questions regarding this biological opinion, please contact Kellie Berry, Sacramento Valley Division Chief (kellie_berry@fws.gov) or Gerry Cobian, Fish and Wildlife Biologist (gerald_cobian@fws.gov) at the letterhead address or telephone (916) 414-6631.

Sincerely,

Jennifer M. Norris, Ph.D.
Field Supervisor

ec:
Ms. Nancy Haley, Chief, California North Section, U.S. Army Corps of Engineers
Mr. William Guthrie, Chief, California Delta Section, U.S. Army Corps of Engineers
Mr. Paul Maniccia, Chief, California South Section, U.S. Army Corps of Engineers

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Ventura USFWS FEMA Programmatic Agreement

Biological Opinion

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, <u>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</u>.

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)]:

<u>Non-Emergency Debris Removal</u>

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.

<u>Constructing, Modifying or Relocating Facilities</u>

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.

<u>General Avoidance and Minimization Measures</u>

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.

<u>Species-specific Conservation Measures</u>

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

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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.

<u>Recovery</u>

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.

<u>Recovery</u>

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)

<u>Recovery</u>

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

<u>Legal Status</u>

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).

<u>Natural History</u>

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 (*Lepidopter*a); 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

<u>Legal Status</u>

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.

<u>Natural History</u>

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.

<u>Arroyo toad Critical Habitat</u>

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.

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

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.

<u>California Tiger Salamander – Santa Barbara DPS</u>

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,

Stephen P. Henry
Field Supervisor

Appendix A

The U.S. Fish and Wildlife Service (Service) consulted on the Federal Emergency Management Agency's (FEMA) Disaster, Mitigation, and Preparedness Programs in California within the Ventura Fish and Wildlife Office (VFWO) and its effects on federally listed species and critical habitat, in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.). The Service provided a programmatic concurrence with FEMA's 'not likely to adversely affect' determination for six listed species and, if applicable, their critical habitat. The programmatic concurrence was based on the assumption that FEMA and its Subapplicants will implement a suite of conservation measures (see Appendix B) developed during extensive collaboration between FEMA and the Service. The measures were designed with species conservation in mind to reduce direct and indirect impacts on listed species to an insignificant and discountable level. If the measures in Appendix B are not able to be implemented for a specific project, FEMA will submit the project for separate section 7 consultation.

California Least Tern (*Sterna antillarum browni*) and Light-Footed Ridgway's Rail (*Rallus longirostris levipes*)

California least tern and light-footed Ridgway's rail could be affected by removal of habitat and direct impacts to nests, nestlings, and eggs. They could also be affected by noise that disrupts breeding, feeding, and predator avoidance. However, FEMA's action includes implementation of the species specific conservation measures listed in Appendix B. Specifically, the measures require project activities in habitat for these species will occur outside the season of use for these species, and ground disturbance will be restricted to hand tools. Thus, impacts will not occur to nest, nestlings, and eggs, and impacts to habitat will have an insignificant effect on California least tern and light-footed Ridgway's rail. Further, project activities during the season of use will occur 800 feet away from California least tern habitat and 500 feet away from light-footed Ridgway's rail habitat, and only hand tools will be used. These measures were designed, with extensive collaboration between the Service and FEMA, to reduce direct and indirect impacts to California least tern and light-footed Ridgway's rail to an insignificant and discountable level. Thus, the VFWO concurs with FEMA's not likely to adversely affect determination.

Contra Costa goldfields (*Lasthenia conjugens*)

Contra Costa goldfields is a vernal pool plant species with previous known occurrences in Santa Barbara and Monterrey counties. Recent wildfires have impacted the status of the species such that we are not currently aware of any known occurrences. This species could be affected by crushing, trampling, or removal of individual plants. Additionally, the species could be impacted by changes in hydrology, introduction of pesticides, or invasive plants into the vernal pool system. However, FEMA's action includes implementation of the species specific conservation measures listed in Appendix B. Specifically, the measures require pre-activity surveys, buffers, erosion control measures, and precautions against invasive species. These measures were designed, with extensive collaboration between the Service and FEMA, to reduce direct and indirect impacts to Contra Costa goldfields to an insignificant and discountable level. Thus, the VFWO concurs with FEMA's not likely to adversely affect determination.

Marbled murrelet (*Brachyramphus marmoratus*)

A small amount of terrestrial habitat for marbled murrelets occurs within the action area. Marbled murrelets could be affected by removal of habitat and direct impacts to nests, nestlings, and eggs. They could also be affected by noise that disrupts breeding, feeding, and predator avoidance. However, FEMA's action includes implementation of the species specific conservation measures listed in Appendix B. Specifically, the measures include restrictions on removal of vegetation, and parameters on activities that may cause disturbance. These measures were designed, with extensive collaboration between the Service and FEMA, to reduce direct and indirect impacts to Marbled murrelet to an insignificant and discountable level. Thus, the VFWO concurs with FEMA's not likely to adversely affect determination.

Riverside Fairy Shrimp (*Streptocephalus woottoni*)

The only known location occurrences of Riverside fairy shrimp within the VFWO's jurisdiction, occur within Designated Critical Habitat Unit (CHU) 1a and 1b. These two CHUs are critically vital to the species' conservation within our jurisdiction. However, FEMA's action includes implementation of the species specific conservation measures listed in Appendix B. Specifically, the measures exclude projects that have any adverse effects to CHU 1a and 1b and also prevent impacts to the actual basin/inundation features in any suitable Riverside fairy shrimp habitat. These measures were designed, with extensive collaboration between the Service and FEMA, to reduce direct and indirect impacts to Riverside fairy shrimp to an insignificant and discountable level. Thus, the VFWO concurs with FEMA's not likely to adversely affect determination.

Western Snowy Plover (*Charadrius nivosus* ssp*. Nivosus*)

Western snowy plover could be affected by removal or modification of habitat and direct impacts to nests, nestlings, and eggs. They could also be affected by noise that disrupts breeding, feeding, and predator avoidance. However, FEMA's action includes implementation of the species specific conservation measures listed in Appendix B. Specifically, the measures require project activities in habitat for these species to be restricted to hand tools, and temporary impacts to be restored. Thus, impacts due to habitat loss will be insignificant. Also, a biological monitor will be used to ensure that impacts to breeding western snowy plovers are avoided. Human activities and use of hand tools during the non-breeding season may result in minor disturbance or displacement of overwintering birds, but these activities are not anticipated to substantially impact western snowy plover survival or reproduction. These measures were designed, with extensive collaboration between the Service and FEMA, to reduce direct and indirect impacts to Western snowy plover to an insignificant and discountable level. Thus, the VFWO concurs with FEMA's not likely to adversely affect determination.

Appendix B

The U.S. Fish and Wildlife Service (Service) consulted on the Federal Emergency Management Agency's (FEMA) Disaster, Mitigation, and Preparedness Programs in California within the jurisdiction of the Ventura Fish and Wildlife Office (VFWO) and its effects on federally listed species and critical habitat, in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.). FEMA provided these conservation measures as part of the programmatic biological assessment[1] (PBA) for the programmatic consultation. Implementation of the following conservation measures is required in order for any specific project activity to be considered under the programmatic concurrence provided in the accompanying document. For any actions where FEMA or its Subapplicants are unable to implement the following measures, FEMA must submit the project for separate section 7 consultation as the effects to listed species or their designated critical habitat outside the scope of these conservation measures have not been assessed or analyzed.

Conservation Measures for California Least Tern (*Sterna antillarum browni*) and Light-Footed Ridgway's Rail (*Rallus longirostris levipes*)

1. To avoid the nesting season of the California least tern, project activity in occupied habitat will be allowed from September 30 - March 31. Occupied habitat for this species is well documented online. If project activities occur during the nesting season, they will occur at least 800 feet away from California least tern occupied habitat, and noise within occupied habitat will be monitored to ensure that it does not exceed 60 decibels hourly Leq.
2. A habitat assessment will be conducted by a biologist to determine whether suitable habitat (including foraging, nesting, and dispersal) for the light-footed Ridway's rail 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 light-footed Ridway's rail, the VFWO will be contacted regarding the need for additional surveys and those surveys will be conducted, as appropriate. Otherwise, if the VFWO agrees, the species will be assumed to be present in areas with suitable habitat.
3. To avoid the nesting season of the light-footed Ridway's rail, project activity in occupied habitat will be allowed from September 16 - March 14. If project activities occur during the nesting season, they will occur at least 500 feet away from light-footed Ridgway's rail occupied habitat, and noise within occupied habitat will be monitored to ensure that it does not exceed 60 decibels hourly Leq.
4. A Service-approved biologist will monitor all construction activities within occupied habitat to ensure that no take of the species or destruction of occupied habitat occurs. The Service-approved biologist will have stop work authority if adverse effects of nesting California least terns or light-footed Ridgway's rails are observed.
5. Non-breeding season project activity in occupied habitat will be limited to the use of handheld tools, including handheld motorized implements such as chain saws and power

[1] The measures in the PBA are part of a state-wide consultation. The measures were created by different Service offices in collaboration with FEMA. For consistency with the state-wide programmatic, we have kept the numbering system reflective of the PBA even though it is not consistent within this appendix.

augers. Tools will be washed prior to use in these habitats to reduce the potential for spread of non-native and invasive plant species and their seeds. No heavy equipment will be allowed within suitable nesting habitats.

6. No soil stabilization materials or off-site materials (e.g., decomposed granite, soil, rocks, etc.) will be added to the surface within occupied habitat. No excavation or grading would be allowed within occupied habitat either.
7. If handheld motorized tools are used, operators will employ best management practices to avoid and minimize soil and water contamination from fuel and lubricants. Measures include:
    a. use spill-resistant fuel and lubricant containers;
    b. use a portable containment pad for re-fueling in the field;
    c. immediately report petroleum spills to the landowner, or land management agency, and notify appropriate local authorities for advice and action on containment and cleanup of spills; and
    d. clearly mark the location and/or boundaries of the spill site to enable rapid remedial action.
8. When necessary to minimize the area affected by the project, work site boundaries will be marked with flagging or other visible materials, which will be removed at the conclusion of the project.
9. Workers will avoid temporary or permanent placement of structures (e.g., posts, railings, tall equipment, or fence lines) that could provide elevated perches for predatory birds near or within occupied habitat.
10. Access to work sites in occupied habitat will be by foot travel only. Motorized vehicles, including all-terrain vehicles, will not be used in occupied habitat.
11. At the conclusion of the project, areas temporarily affected by project activity will be restored to their pre-project condition (e.g. footpaths will be raked to their original ground contour and native vegetation will be reestablished, if necessary).
12. Trash, food, food containers, and food waste will be secured at all times by individual workers, or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.
13. Project activities will avoid creation of berms and dykes, steepening of channel slopes, placement of rock slope protection, and other actions that could result in alteration of hydrology, changes to water surface elevation levels, increased flooding, changes to flow velocities, and increased scour within light-footed Ridgway's rail occupied habitat.

Conservation Measures for Contra Costa goldfields (*Lasthenia conjugens*)

To avoid and minimize potential adverse effects to the vernal pool plants, the measures listed below will be implemented in the project footprint where suitable listed branchiopod habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur.

<u>Vernal Pools</u>

1. If possible, prior to construction activities, the Service-approved biologist will conduct protocol-level bloom-season plant surveys in seasonally inundated habitats (seasonal wetland, non-inundated wetlands) within the project footprint. If any listed vernal pool plant species are found during the surveys, the Service-approved biologist will submit a

report to the Service within 1 month of completing the field work. The report will provide results of all surveys, a summary of all the data collected, and the habitat assessment. Information regarding the location of listed plant populations will be provided to CDFW's California Natural Diversity Database (CNNDB) according to their reporting protocols. If surveys are not possible, then listed vernal pool species presence will be assumed on all suitable habitats within the Action Area.

2. Flagging or other field markers identifying the plants, or in the event protocol-level surveys were not conducted – the suitable habitat, will be placed prior to each work event and removed after that work event is completed for all phases of the proposed project.
3. A Service-approved biologist will monitor all construction activities within 250 feet of suitable habitat for listed vernal pool plants to ensure that no unnecessary loss or destruction of habitat occurs.
4. A Service-approved biologist will delineate a 50-foot avoidance buffer around all listed plants or their suitable habitat. The non-disturbance exclusion zones will be established, maintained and monitored by a Service approved biological monitor to ensure that loss of listed vernal pool plants or destruction of their habitat does not occur outside of the project footprint where suitable habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur.
5. Work within 250 feet of suitable listed vernal pool plant habitat (e.g., vernal pools, seasonal wetlands) will be performed between June 1 and October 15 under dry site conditions to the maximum extent possible to minimize potential adverse impacts to aquatic habitats.
6. A Service-approved project biologist will flag or monitor all operations and maintenance work during the *dry season* (generally June 1 to October 15) within 250 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:
    a. Hand-held herbicide application is prohibited within the pool or at the edge of the pool;
    b. Power spray herbicide application is prohibited within 100 feet of the edge of the pool;
    c. Broadcast herbicide application is prohibited within 150 feet of the edge of the pool; and
    d. Ground-disturbing activities are prohibited within 25 feet of the edge of the pool.
7. If any construction activities remain and must occur during the October 15 - June 1 *wet period*, exclusion fencing and erosion control materials will be placed around the vernal pools and other seasonal wetlands as determined by the Service-approved biologist to reduce sedimentation into vernal pool habitat. The fencing will provide a buffer between construction activities and the vernal pools and other seasonal wetlands. The Service approved biologist will erect and maintain the exclusion fencing.
8. Any vernal pool, vernal pool grassland, or seasonal wetland will be protected from siltation and contaminant runoff by use of erosion control.
9. Erosion-control materials will be of a tightly woven natural fiber netting or similar material that will not entrap reptiles and amphibians (e.g., coconut coir matting). No micro-filament netting will be used.
10. Erosion-control measures will be placed between the outer edge of the buffer and the activity area. All fiber rolls and hay bales used for erosion control will be certified as free of noxious weed seed.

11. Dust control measures will be implemented to prevent the transport of soil from exposed surfaces to vernal pool, swale, and rock pool habitat. Sprinkling with water will not be done in excess to minimize the potential for non-storm water discharge.
12. A Service-approved biologist will flag or monitor all operations and maintenance work during the *wet season* (generally October 1 to June 1) within 150 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:
    a. Hand-held herbicide application is prohibited within 25 feet of the edge of the pool;
    b. Power spray herbicide application is prohibited within 100 feet of the edge of the pool;
    c. Broadcast herbicide application is prohibited within 150 feet of the edge of the pool;
    d. Manual clearing of vegetation is prohibited at the pool or beyond the edge;
    e. Mechanical clearing of vegetation is prohibited within 100 feet of the edge of the pool; and
    f. Ground-disturbing activities are prohibited within 50 feet of the edge of the pool.
13. A buffer of at least 300 feet from any vernal pool, vernal pool grassland, or seasonal wetland will be established for the following:
    a. Staging areas of all equipment for storage, fueling, and maintenance with hazardous material absorbent pads available in the event of a spill; and
    b. Mixing of pesticides, herbicides, or other potentially toxic chemicals.
14. Vehicles will be inspected daily for fluid leaks before leaving a staging area.
15. Routine maintenance activities within 250 feet of vernal pool and swale habitat will be avoided to the maximum extent possible.
16. When restoring upland areas to pre-project condition, native plants will be used to the maximum extent practicable.
17. To minimize the introduction of invasive plant species, construction vehicles will be cleaned prior to entering any vernal pool habitat.

Conservation Measures for Marbled murrelet (*Brachyramphus marmoratus*)

(a) Occupied Habitat

If marbled murrelet surveys (using the Service 2003 survey protocol; Evans Mack *et al.* 2003) determine[2] that the Action Area is occupied **or** if FEMA or the Service presumes marbled murrelet occupancy without conducting surveys, the project Subapplicant will adhere to the following Conservation Measures:

i. Vegetation Removal or Alteration of Known or Potential Nest Trees:
    a. No potential marbled murrelet nest trees[3] will be removed during the nesting season (March 24 to September 15).

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[2] Surveyors are required to meet or exceed all training recommendations in Evans Mack et al. (2003), and be registered as qualified surveyors on a current Service 10(a)1(b) Recovery Permit.

[3] Potential habitat defined by Nelson et al. (2003) as: (1) mature (with or without an oldgrowth component) and old-growth coniferous forests; and (2) younger coniferous forests that have platforms (relatively flat, at least 4-inch diameter and at least 33 feet above the base of the live crown of a coniferous tree). Platform presence is more important that tree size.

b. Avoid removing or damaging known or potential nest trees, unless they are a confirmed safety hazard. For sites that have not been surveyed according to 2003 survey protocol, potential habitat is defined as (1) mature (with or without an old-growth component) and old growth coniferous forests; **and** (2) younger coniferous forest that have platforms.

c. Avoid removing or damaging trees with potential nesting platforms. A platform is a relatively flat surface at least 10 centimeters (4 inches) in diameter and 10 meters (33 feet) in height in the live crown of a coniferous tree. Platforms can be created by a wide bare branch, moss or lichen covering a branch, mistletoe, witches brooms, or other deformities, or structures such as squirrel nests.

d. Project activities will not remove the function of suitable nesting habitat.
   - While habitat elements may be removed, such as individual large trees if they are a confirmed safety hazard, from nesting habitat, the treatment must not be so extensive as to remove the overall function of the nesting habitat, and will be conducted outside of the nesting season.

e. Non-suitable nest trees or limb trimming or pruning, brush trimming or removal, and hazard tree felling within suitable habitat may occur outside of the nesting season, September 16 to March 23.

ii. Auditory, Visual, or Other Disturbance:

a. Construction equipment must be in good working order, with emphasis on hydraulic and noise abatement systems. Hydraulic leakage and damaged mufflers (or spark arresters) must be promptly addressed and remedied to the degree practicable.

b. No proposed activity generating sound levels 20 or more decibels above ambient sound levels **or** with maximum sound levels (ambient sound levels plus activity-generated sound levels) above 90 decibels (excluding vehicle back-up alarms) may occur within suitable marbled murrelet nesting habitat during the majority of the murrelet nesting season (*i.e.,* March 24 to August 5)

c. Between August 6 (date when most marbled murrelets have fledged in coastal northern California) and September 15 (end of marbled murrelet nesting season) of any year, project activities, with adjacent suitable nesting habitat, that will generate sound levels greater than or equal to 10 decibels above ambient sound levels will observe a daily work window beginning 2 hours post-sunrise and ending 2 hours pre-sunset. However, prep work that does not generate sound levels above ambient sound levels, including street sweeping and manual removal of pavement markers, can occur during all hours. The need for this daily work window depends on the distance between suitable nesting habitat and the above-ambient sound generating activity following the Service guidelines (Service 2006). For example, if above-ambient sound levels generated by proposed activities will become attenuated back down to ambient sound levels prior to reaching suitable nesting habitat, the daily work window would not be necessary.

d. No human activities will occur within visual line-of-sight of 40 meters (131 feet) or less from a known nest or suitable nest tree during the nesting season (March 24 to September 15) (Service 2006).

(b) Unoccupied Habitat

(i) If recent protocol surveys determine that all suitable marbled murrelet nesting habitat within the Action Area is considered unoccupied, the auditory, visual, and other disturbance measures listed above under iii) do not apply for habitat determined to be unoccupied.

(c) Marbled Murrelet Critical Habitat

(i) Ensure that there are no "adverse effects" to designated critical habitat for marbled murre+let within the Action Area. However, the Service has no specific quantitative thresholds, above which there would likely be an adverse effect to critical habitat. If a Subapplicant's proposed project encounters this situation, contact the Service to determine whether proposed habitat removal within designated critical habitat would constitute an adverse effect. Generally, the removal of a few small trees in unoccupied habitat would not result in adverse effect" on designated critical habitat.
(ii) When working in designated critical habitat for marbled murrelet, all measures described in Items (a) Occupied Habitat, or (b) Unoccupied Habitat for reducing impacts in suitable habitat will also be implemented. This will help reduce effects, and may result in some instances in effects that are insignificant and discountable.

Literature Cited

Evans Mack, D., W. P. Ritchie, S. K. Nelson, E. Kuo-Harrison, P. Harrison, and T. E. Hamer 2003. Methods for surveying Marbled Murrelets in forests: a revised protocol for land management and research. Pacific Seabird Group unpublished document available at: http://www.pacificseabirdgroup.org.

Service 2006. Estimating the effects of auditory and visual disturbance to northern spotted owls and marbled murrelets in northwestern California. Available at: http://www.fws.gov/arcata/es/birds/NSO/ns_owl.html.

Conservation Measures for Western Snowy Plover

The following avoidance and minimization measures apply to Action Areas within suitable snowy plover nesting habitat and designated critical habitat regardless of whether snowy plovers have been detected during Service approved protocol surveys.

(a) Project construction activities in suitable nesting habitat will occur during the species non-breeding season: the period beginning October 1 and continuing through February 28 of the following year; or through February 29 in a leap year.
(b) Project construction activities in suitable nesting habitat will be limited to the use of handheld tools including handheld motorized implements such as chain saws and power augers. No heavy equipment will be allowed within suitable nesting habitat.
(c) If handheld motorized implements are used, operators will employ best management practices to avoid and minimize soil and water contamination from fuel and lubricants. Measures include:

1. Use spill-resistant fuel and lubricant containers;
2. Consider the use of a portable containment pad for re-fueling in the field;
3. Immediately report petroleum spills to the landowner, or land management agency, and notify appropriate local authorities for advice and action on containment and cleanup of spills; and
4. Clearly mark the location and/or boundaries of the spill site to enable rapid remedial action.

(d) If project construction activities occur in adjacent to, but not within suitable nesting habitat, then project activities should be conducted during the species non-breeding season, if possible. If nonbreeding season construction is not possible, then the Subapplicant will employ a Service-approved biologist to conduct weekly western snowy plover surveys. If western snowy plovers are observed, the Service-approved biologist will notify the Service within 1 day of the observation and will monitor all construction activities conducted adjacent to western snowy plovers suitable nesting habitat. The qualified biologist will have the right and responsibility to stop work if adverse effects of nesting western snowy plovers are observed.

(e) When necessary to minimize the area affected by the project, the Subapplicant or their contractors will mark the work site boundaries with flagging or other visible materials, and remove those markers at the conclusion of the project.

(f) Workers will avoid temporary or permanent placement of structures (e.g., posts, railings, tall equipment, or fence lines) that could provide elevated perches for predatory birds.

(g) Access to work sites will be by foot travel only. Motorized vehicles, including all-terrain vehicles, are not permitted on work sites located within suitable nesting habitat.

(h) Vehicles used for transport of personnel will be restricted to existing parking lots or roadside parking areas.

(i) At the conclusion of the project, areas temporarily impacted by project activity will be restored to their pre-project condition (for example, footpaths are to be raked to their original ground contour and cut vegetation is to be removed or piled for future disposal).

(j) Trash, food, food containers, and food waste will be secured at all times by individual workers, or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.

(k) Pets will be prohibited from all work sites.

Conservation measures for Riverside fairy shrimp

The following conservation measures apply to any suitable Riverside 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).

1. 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 three 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 Ventura Fish and Wildlife Office (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.

2. Any projects that have the potential to result in adverse effects to Critical habitat units 1a and 1b designated for Riverside fairy shrimp in Ventura County are not included in this concurrence and will require separate consultation.
3. 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.
4. 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 following measures will be implemented as applicable.
5. Disturbance exclusion zones will be established, maintained, and monitored by a VFWO-approved biologist to ensure that impacts to basin/inundation features watershed, and/or critical habitat do not extend beyond the identified project footprint.
6. 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.
7. 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.
8. 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:
   (a) There will be no soil disturbing activities or herbicide application in a basin/inundation feature or within 25 feet of such a feature;
   (b) There will be no held herbicide application within 50 feet of a basin/inundation feature;
   (c) There will be no power spray herbicide application within 100 feet of a basin/inundation feature; and
   (d) There will be no broadcast herbicide application within 150 feet of a basin/inundation feature.
9. 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) A VFWO-approved biologist will monitor all site preparation, construction, and/or maintenance activities to occur within 150 feet of a basin/inundation feature.

(b) 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
(c) There will be no soil disturbing activities or manual clearing of vegetation in or within 50 feet of a basin/inundation feature;
(d) There will be no mechanical clearing of vegetation within 100 feet of a basin/inundation feature;
(e) There will be no hand-held herbicide application within 25 feet of the edge of a basin/inundation feature; and
(f) There will be no power spray or broadcast herbicide application within 150 feet of a basin/inundation feature.

10. The following practices will be implemented within or immediately adjacent to fairy shrimp habitat:
    (a) 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.
    (b) 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.
    (c) 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.
    (d) 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.
    (e) Vehicles will be inspected daily for fluid leaks before leaving a staging area.
11. 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.
12. 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.

Appendix C

ESA Review Form for Projects Under FEMA's PBA with USFWS in California in the Sacramento, Ventura, or Carlsbad FWO Jurisdictions (to be submitted to USFWS)

INSTRUCTIONS: This Endangered Species Act (ESA) Review Form is for proposed projects that may be funded under various FEMA grants programs in California and that would be covered under FEMA's Programmatic Biological Assessment (PBA) and the corresponding U.S. Fish and Wildlife Service (USFWS) Programmatic Biological Opinions (PBOs) from the Sacramento, Ventura, and Carlsbad Fish and Wildlife Offices (FWOs). This form must be filled out by a qualified Biologist[1] who is knowledgeable on the ESA, federally listed species[2] and their habitats, and Critical Habitat[3]. This form provides the information necessary for FEMA to make a determination of effects from the Subapplicant's proposed project for compliance with the ESA regarding federally listed species and their Critical Habitats. For subapplicant's proposed projects that meet the criteria for coverage under the PBA-PBOs, FEMA would submit this completed form to the USFWS and request coverage under the one of the PBA-PBOs from the applicable FWO. There are four sections in this form (check the sections being submitted):

- ☐ **Section A:** Information on the proposed project,
- ☐ **Section B:** Determination of effects to federally listed species and/or Critical Habitat protected under the ESA,
- ☐ **Section C:** ESA Review for Not Likely to Adversely Affect (NLAA) determinations for proposed projects under the applicable FEMA PBA-PBO, and
- ☐ **Section D:** ESA Review for Likely to Adversely Affect (LAA) determinations for proposed projects under the applicable FEMA PBA-PBO.
- ☐ **Section E:** For USFWS to complete and sign.

Please complete **Sections A** and **B**, and complete either **Section C** or **D** of the form, as needed. Use the highest level of the ESA determination to select whether to complete Section C or D of this form. If there is an LAA determination for at least one federally listed species and/or Critical Habitat, please complete Section D only and address the other species in that section as well. Attach photographs, relevant maps, preliminary engineering designs, and any additional information on the Subapplicant's proposed project. After completing the applicable sections of this form, please fill out the Summary Table below:

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[1] A qualified Biologist consists of an environmental professional with at least a Bachelor's degree in Biology, Ecology, Natural Resources, Environmental Sciences, or similar, and has significant experience over multiple years working with federally listed species, their habitats, and Endangered Species Act implementation in the State of California.

[2] In this form, the term "federally listed species" includes species listed or proposed to be listed as threatened or endangered under Endangered Species Act.

[3] In this form, the term "Critical Habitat" refers to designated Critical Habitat and proposed Critical Habitat for federally listed species protected under the Endangered Species Act.

Summary Table Summary of ESA Effects Determination on Federally Listed Species and Critical Habitat			
FEMA Grant # or Disaster # and Project Worksheet # and Site/LOP #	**Species Name**	**ESA Effects Determination**	**Critical Habitat**
	Species 1 (common and scientific name)	Choose between: • No effect • May affect, but is not likely to adversely affect • May affect, and is likely to adversely affect	Choose between: • No effect • May affect, but is not likely to adversely affect critical habitat • May affect, and is likely to adversely affect critical habitat (i.e., physical and biological features)
	Species 2 (common and scientific name)	Choose between: • No effect • May affect, but is not likely to adversely affect • May affect, and is likely to adversely affect	Choose between: • No effect • May affect, but is not likely to adversely affect critical habitat • May affect, and is likely to adversely affect critical habitat (i.e., physical and biological features)
	Species 3 (common and scientific name)	Choose between: • No effect • May affect, but is not likely to adversely affect • May affect, and is likely to adversely affect	Choose between: • No effect • May affect, but is not likely to adversely affect critical habitat • May affect, and is likely to adversely affect critical habitat (i.e., physical and biological features)

Note: If the Subapplicant's proposed project is under another Federal agency's jurisdiction (e.g., U.S. Forest Service, National Park Service, Bureau of Land Management, Bureau of Reclamation, etc.) or another Federal agency is functioning as the Lead Federal Agency (e.g., U.S. Army Corps of Engineers), then there no need to prepare this FEMA form.

Name of Qualified Biologist and Date of Preparation: **Biologist's Qualifications:** **Professional Degree:** **Years of experience working with federally listed species, their habitats, and Endangered Species Act implementation in the State of California:**
SECTION A. INFORMATION ON PROPOSED PROJECT (press F11 to advance to the next field)
A.1. Project Name:
A.2. FEMA Grant # or Disaster and Project Worksheet #s:
A.3. Name of Subapplicant (Agency Name)[4]:
A.4. Project Location (street address, latitude/longitude, or UTM and Datum/Zone):
A.5. State/County/Municipality:
A.6. Description of the Action Area[5]: **Please attach a map(s), aerial image, photographs, GIS data layers, and other information on the Action Area. Please include a description of the vegetation communities, aquatic habitats, slope, ambient noise levels, and any sensitive biological resources in the Action Area.** **Briefly describe the project footprint[6] in a few sentences below:**

[4] In the case of a Tribe, the term to be used is "Applicant".

[5] Action Area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02).

[6] Project footprint corresponds to all the areas with structures affected by implementation of the Subapplicant's proposed project, including construction staging areas, spoils disposal sites, gravel or rock pits, access routes, any areas of ground disturbance, etc.

Are any water bodies including rivers, streams, seasonal wetlands (i.e., vernal pools, ponds, wet meadows, etc.), estuaries, or coastal water bodies located within the Action Area?
☐ **YES** ☐ **NO**

If Yes, will in-water work be needed for completion of the Subapplicant's proposed project?
☐ **YES** ☐ **NO**

If No, how far is the water body from the limits of ground disturbance and/or vegetation removal?

What is the name of the river, stream, estuary, or coastal water body? If the river/stream is a tributary, provide the name of the receiving water body. For seasonal/annual bodies of water, describe the time of year and the duration of time that water is typically present. Describe the flow of water (i.e., still, slow moving, swift, etc.) anticipated during the scheduled activities for the proposed project.

A.7. Proposed Project Schedule and Duration:
Please provide start and end dates (including month and year) of project implementation, number of work days, and number of work hours per day (e.g., 5 days of work for 10 hours per day).

Start Date End Date

Number of work days:

Number of work hours per day:

Will any work activities occur during nighttime? If so, please describe them.

A.8. Description of Subapplicant's Proposed Project:
Describe the project activities in detail, including construction methods (i.e., equipment to be used, access routes, construction work areas, construction staging areas, spoils disposal sites, gravel or rock pits, etc). Include the Subapplicant's best management practices[7] to be implemented, and post-construction activities, if applicable. (The details described here are as provided by the Subapplicant in their project description.) Attach project plans and layouts and post-project monitoring and reporting plans, if available.

Select the applicable project type(s):
☐ **Non-Emergency Debris Removal**
☐ **Road and Trail Construction**
☐ **Utility Construction**
☐ **Rail Line Construction**
☐ **Flood Control Activities**
☐ **Culvert Construction**
☐ **Airport Runway Construction**
☐ **Facility Disaster Mitigation Activities**
☐ **Building and Facility Construction**
☐ **Channelization**
☐ **Stormwater Management**
☐ **Dam Construction**
☐ **Bridge Construction**
☐ **Bank Protection, Stabilization, and Erosion Control Activities**
☐ **Detention/Retention, or Basin Water Storage Facility Construction**
☐ **Linear Water Conveyance Facility Construction**
☐ **Shoreline Facilities - Recreational or Maritime Use**
☐ **Shoreline Facilities - Protection**
☐ **Wildfire Risk reduction - Defensible Space Creation and Hazardous Fuels Reduction**

Describe the access routes:

[7] In this form, BMPs refer to standard measures proposed by the subapplicant as part of their proposed project. BMPs should not be confused with the Conservation Measures included in FEMA's PBA and the corresponding USFWS PBO.

Describe the construction staging and work areas:

If the Subapplicant's proposed project includes vegetation removal and/or trimming, describe the vegetation type and the extent that would be removed and/or trimmed. Describe the planned revegetation efforts, which should be consistent with the measures described in the applicable PBA-PBO.

SECTION B. DETERMINATION OF EFFECTS TO FEDERALLY LISTED SPECIES AND/OR CRITICAL HABITAT PROTECTED UNDER ESA

B.1. Does the Action Area for the Subapplicant's proposed project have the potential to support federally listed species and/or does it contain Critical Habitat including physical or biological features essential for the conservation of the species? Also, describe the methods and results of any listed species surveys and/or habitat assessments conducted.

Surveys/Habitat Assessment:

☐ **NO**

It has been determined that the Action Area occurs either:

- ☐ **a) Outside the range of any federally listed species,**
- ☐ **b) Within the range of a federally listed species but outside of occupied or suitable habitat and outside Critical Habitat, or**
- ☐ **c) Within Critical Habitat designation but lacks the physical or biological features essential for the conservation of the species.**

Go to B.2.

☐ **YES. List the federally listed species and Critical Habitat that is present or potentially present in the Action Area of the Subapplicant's proposed project (go to B.2)**

B.2. Could the Subapplicant's proposed project directly or indirectly affect federally listed species and/or Critical Habitat (i.e., the physical or biological features essential for the conservation of the species) in the Action Area?

☐ **NO**

No Effect. FEMA has determined that implementation of the proposed project would not affect federally listed species and/or Critical Habitat. If a No Effect determination has been made for the proposed project, do not complete Section C (for NLAA determinations only), nor Section D (for LAA determinations only). No notification to FEMA is required.
No consultation with the USFWS is required under the ESA.

☐ **YES (go to B.3)**

B.3. Can the Subapplicant incorporate the general *Avoidance and Minimization Measures* and the species-specific *Conservation Measures* listed in the applicable FEMA PBA-PBO into the proposed project to avoid or minimize effects on federally listed species (including avoiding take[8] as defined under ESA) and/or their Critical Habitat to levels that are insignificant, discountable, or wholly beneficial?

☐ **YES**

FEMA has determined that the proposed project May Affect, but is Not Likely to Adversely Affect (NLAA) federally listed species and/or their Critical Habitat. Direct and indirect effects would be insignificant, discountable or wholly beneficial. There are no adverse effects to species or their Critical Habitat. As such, take of individual(s) or destruction/adverse modification to Critical Habitat will not occur. Complete Section C of this form for NLAA determinations. FEMA will notify the USFWS by submitting the completed ESA Review Form for the proposed project and request that the proposed project be covered under the applicable FEMA PBA-PBO as an NLAA project.

☐ **NO**

FEMA has determined that the proposed project is Likely to Adversely Affect (LAA) at least one federally listed species and/or their Critical Habitat. Adverse effects to at least one federally listed species or at least one physical or biological feature of Critical Habitat may occur to reach an LAA determination. Complete the relevant portions of Section D of this form for LAA determinations. FEMA will notify the USFWS by submitting the completed ESA Review Form for the proposed project which may request coverage under the Incidental Take Statement (ITS) already included in the USFWS PBO issued to FEMA, if applicable.

SECTION C. ESA REVIEW FOR NLAA DETERMINATIONS FOR PROPOSED PROJECTS UNDER THE APPLICABLE FEMA PBA-PBO

C.1. Briefly describe the species potential to occur onsite (including closest CNDDB occurrences, suitable habitat, etc.) and the potential direct and indirect effects from implementation of the Subapplicant's proposed project in the Action Area. Refer to the applicable FEMA PBA-PBO for a description of potential effects, and describe additional effects as applicable.

a. **Direct and Indirect Effects on Federally Listed Species**

b. **Direct and Indirect Effects on Critical Habitat (including effects on specific Physical and Biological Features[9])**

C.2. Please list all the general *Avoidance and Minimization Measures* and the species-specific *Conservation Measures* that are applicable from the FEMA PBA-PBO, and indicate which will be implemented and why implementation of others is not necessary for the Subapplicant's proposed project to avoid and minimize direct and indirect effects, and briefly note how they would reduce those effects within the Action Area on the following:

a. **Federally Listed Species**

b. **Critical Habitat**

[8] Take: Under the ESA "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct [ESA §3(19)].

[9] Per 81 *FR* 7414, the physical or biological features refer to the features that are present that are essential to the conservation of the species and may require special management considerations or protection, which were formerly referred to as "Primary Constituent Elements."

Note: Please note that take (as defined under the ESA) of federally listed species is not allowed under the NLAA determination. If take of a federally listed species is reasonably certain to occur, then please fill out Section D for LAA determinations instead of this one.
C.3. Are there any interrelated[10] and/or interdependent[11] actions associated with the Subapplicant's proposed project? If so, please describe them.
C.4. Are there any other FEMA funded projects occurring within 1 mile of the Subapplicant's proposed project? If so, please list the disaster number (DR), Project Worksheet (PW), project name, and distance to this proposed project.
C.5. Summary of FEMA's NLAA Determination for Federally Listed Species and Critical Habitat from implementation of the Subapplicant's proposed project to demonstrate that the subapplicant's proposed project will have insignificant, discountable, or wholly beneficial effects to federally listed species or their Critical Habitat. List all the federally listed species and/or Critical Habitat covered under this NLAA determination. An ESA determination for each federally listed species and/or Critical Habitat is required. **Species**: (common name) **Determination Rationale for Species**: This project may affect, but is not likely to adversely affect the XX because of XXX (briefly summarize supporting rationale, application of AMMs, timing of actions, etc.). **Determination Rationale for Critical Habitat**: This project may affect, but is not likely to adversely affect the Physical and Biological Features of the species Critical Habitat because of XXX (briefly summarize supporting rationale, etc.). **Species**: (common name) **Determination Rationale for Species**: This project may affect, but is not likely to adversely affect the XXX because of XXX (briefly summarize supporting rationale, application of AMMs, timing of actions, etc.) **Determination Rationale for Critical Habitat**: This project may affect, but is not likely to adversely affect the Physical and Biological Features of the species Critical Habitat because of XXX (briefly summarize supporting rationale, etc.).
SECTION D. ESA REVIEW FOR LAA DETERMINATIONS FOR PROPOSED PROJECTS UNDER THE APPLICABLE FEMA PBA-PBO
D.1. Briefly describe the species potential to occur onsite (including closest CNDDB occurrences, suitable habitat, etc.) and the potential direct and indirect effects from implementation of the Subapplicant's proposed project in the Action Area. Refer to the applicable FEMA PBA-PBO for a description of potential effects, and describe additional effects as applicable. **a. Direct and Indirect Effects on Federally Listed Species (including the potential for take to occur)**

[10] Interrelated actions are actions that are part of a larger action and depend on the larger action for their justification (50 CFR §402.02).

[11] Interdependent actions are actions having no independent utility apart from the proposed action (50 CFR §402.02).

b. **Direct and Indirect Effects on Critical Habitat (including effects on specific Physical and Biological Features[12]). If there are adverse effects, quantify the area (in acres, square feet, etc.) of Critical Habitat affected.**

D.2. Please list all the general *Avoidance and Minimization Measures* and the species-specific *Conservation Measures* that are applicable from the FEMA PBA-PBO , and indicate which will be implemented and why implementation of others is not necessary for the Subapplicant's proposed project to avoid and minimize direct and indirect effects, and briefly note how they would reduce those effects within the Action Area on the following:

a. **Federally Listed Species**

b. **Critical Habitat**

Note: Please note that take (as defined under the ESA) of federally listed species and/or destruction/adverse modification to Critical Habitat may occur under an LAA determination.

D.3. Based on the information provided in Sections D.1 and D.2, is there potential for the Subapplicant's proposed project to result in take of a federally listed species?

☐ **YES**

FEMA has determined that the proposed project may result in take of at least one federally listed species, and FEMA is requesting coverage under the ITS previously issued from the USFWS to FEMA under the programmatic consultation for ESA Section 7 compliance to be complete. Complete Sections D.4 through D.10 of this form to make an LAA determination and request coverage under the existing ITS. FEMA will notify the USFWS by submitting the completed ESA Review Form for the proposed project.

☐ **NO**

Complete Sections D.7 through D.10 (skip Sections D.4 through D.6) of this form for LAA determinations. FEMA will notify the USFWS by submitting the completed ESA Review Form for the proposed project.

D.4. Briefly describe the mechanism(s) of take as it may occur from implementation of the Subapplicant's proposed project in the Action Area.
Mechanism(s) of Take

D.5. Describe any additional –project-specific measures that would be implemented to reduce the magnitude of take.

[12] Per 81 *FR* 7414, the physical or biological features refer to the features that are present that are essential to the conservation of the species and may require special management considerations or protection, which were formerly referred to as "Primary Constituent Elements."

D.6. Provide an estimate of the magnitude of take for each federally listed species that may result from the Subapplicant's proposed project, including:

- **Take estimate based on existing population status, if available, otherwise use the area of suitable habitat affected as a surrogate for the take estimate;**
- **References for any materials utilized to develop these estimates.**

a. Species 1 – Estimated Take

b. Species 2 – Estimated Take

c. (Add entries for additional species, if needed)

d. References

D.7. Are there any cumulative effects[13] anticipated from implementation of the Subapplicant's proposed project, including construction activities? If so, please describe them.

D.8. Are there any interrelated[14] and/or interdependent[15] actions associated with the Subapplicant's proposed project? If so, please describe them.

D.9. Are there any other FEMA funded projects occurring within 1 mile of the Subapplicant's proposed project? If so, please list the disaster number (DR), Project Worksheet (PW), project name, and distance to this proposed project.

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[13] Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR §402.02).

[14] Interrelated actions are actions that are part of a larger action and depend on the larger action for their justification (50 CFR §402.02).

[15] Interdependent actions are actions having no independent utility apart from the proposed action (50 CFR §402.02).

D.10. Provide a summary of FEMA's LAA Determination for Federally Listed Species and Critical Habitat from implementation of the Subapplicant's proposed project. List all the federally listed species and/or Critical Habitat that could be directly or indirectly affected, and summarize those effects as they are presented in this Section. An ESA determination for each federally listed species and/or Critical Habitat is required.

Species: (common name)
Determination Rationale for Species: This project may affect, and is likely to adversely affect the XX because of XXX (briefly summarize supporting rationale for the adverse effect determination, application of AMMs, timing of actions, etc.).
Determination Rationale for Critical Habitat: This project may affect, and is likely to adversely affect the Physical and Biological Features of the species Critical Habitat because of XXX (briefly summarize supporting rationale for the adverse effect determination, etc.).

Species: (common name)
Determination Rationale for Species: This project may affect, and is likely to adversely affect the XXX because of XXX (briefly summarize supporting rationale for the adverse effect determination, application of AMMs, timing of actions, etc.)
Determination Rationale for Critical Habitat: This project may affect, and is likely to adversely affect the Physical and Biological Features of the species Critical Habitat because of XXX (briefly summarize supporting rationale for the adverse effect determination, etc.).

SECTION E. FOR USFWS TO COMPLETE AND SIGN

Project Name:
FEMA Grant # or Disaster and Project Worksheet #s:

☐ **I concur with FEMA's determination on federally listed species and critical habitat as described in this ESA Review Form, pursuant to Section 7 of the Endangered Species Act**. The proposed projects are covered activities, and the affects to the Federally-listed species presented in this ESA Review Form have been analyzed in the July 2019, Programmatic Biological Opinion for the Federal Emergency Management Agency's Disaster, Mitigation, and Preparedness Programs within the Ventura Fish and Wildlife Office's Jurisdiction (08EVEN00-2018-F-0700) (programmatic biological opinion).

> ☐ Take for listed species presented in Section D of this ESA Review Form is exempt under the programmatic biological opinion.

The proposed projects are appended to the July 2019, programmatic biological opinion under the following Service File Number: [FWS will insert TAILS number].Therefore, no further action pursuant to the Act is necessary for the proposed projects unless new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered; or a new species is listed or critical habitat designated that may be affected by the identified action.

☐ **I do not concur with FEMA's determination for the following reason(s):**

Signature is listed below:

[Name] **Assistant Field Supervisor** **Ventura Fish and Wildlife Office** **U.S. Fish and Wildlife Service**	**Date**

Appendix D

U.S. Fish and Wildlife Service and California Department of Fish and Wildlife

Draft Conservation Strategy and Mitigation Guidance for the California Tiger Salamander, Santa Barbara County Distinct Population Segment

Information in this document is presented in the following order:

1. Purpose
2. Conservation Strategy
3. Impacts to California tiger salamanders
4. Mitigation to Offset Impacts
5. Determining Mitigation
6. Providing Mitigation
7. Siting Mitigation
8. Translocation

This document is not meant to contain complete information regarding species biology, regulatory requirements, U.S. Fish and Wildlife Service policies, or compensatory mitigation procedures. Additional materials supporting this document and providing supplemental information relevant to this topic are indicated within this document. This document will be updated as needed to reflect new scientific information, species needs, or policy changes.

1. Purpose

The U.S. Fish and Wildlife Service (Service) provides this conservation strategy and mitigation guidance document in support of the conservation and recovery of the endangered Santa Barbara County distinct population segment (DPS) of the California tiger salamander. The main purpose of this document is to provide guidance when assessing land use and project development impacts to the Santa Barbara County DPS of the California tiger salamander and to strategically identify our preferred approaches to offset unavoidable impacts through compensatory mitigation when triggered under the Federal Endangered Species Act of 1973, as amended. The recommendations from this document should be assessed and, when appropriate, incorporated into all projects occurring within the known range of the DPS. We recommend that biologists, consultants, and project proponents use it to inform and facilitate their work with the Service in a regulatory context.

The Federal Endangered Species Act of 1973, as amended, is the primary Federal law providing protection for the Santa Barbara County DPS of the California tiger salamander. The listing of the DPS as endangered provided the full protection of Act. Sections 7, 9, and 10 of the Act have been the most relevant sections that have provided a conservation benefit to the species. Section 9 of the Act prohibits unauthorized taking of any federally listed endangered or threatened species. Section 3(18) defines "take" to mean "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

2. Conservation Strategy

The goal of this conservation strategy and mitigation guidance is to protect and manage sufficient habitat to support long-term viability of the Santa Barbara County DPS of the California tiger salamander. The species depends on a series of interconnected aquatic breeding habitats and upland habitats as a metapopulation, making it particularly sensitive to changes in the amount, configuration, and quality of these habitats. The loss and destruction of habitat represents the primary threat to the species. We believe that to ensure the long-term viability of California tiger salamander populations in Santa Barbara County, habitat loss needs to be reduced and that California tiger salamander habitat needs to be conserved and protected following strategic methodology. The recovery plan (Service 2016) lays out recovery criteria by which a minimum viable population can be conserved in each metapopulation area. This conservation strategy and mitigation guidance strives to conserve habitat in a strategic way through mitigation such that recovery criteria will be met in each metapopulation.

Aquatic breeding habitat for California tiger salamanders is characterized as ponds with seasonal, shallow wetlands that alternate between dry and wet periods. For regulatory purposes, ponds with a documented breeding California tiger salamander population are identified as known breeding ponds. Ponds with the appropriate hydroperiod to support California tiger salamander breeding (i.e., at least 10 weeks) and surrounding upland habitat, but in which

California tiger salamander breeding has not been documented, are identified as potential breeding ponds. Potential breeding ponds may have breeding California tiger salamander populations that have not been documented for a variety of reasons, including insufficient survey effort. Salamanders can forego breeding for 2 to 8 years, resulting in negative aquatic surveys despite the presence of the species in adjacent uplands (Trenham et al. 2000). For the purpose of this document, potential breeding ponds are treated the same as known breeding ponds. For project purposes, potential breeding ponds are presumed to be known breeding ponds unless a negative finding is achieved by correctly and completely following the Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander (Service and Department 2003).

We used the average size of known breeding ponds in Santa Barbara County (1.47 acres) to define the number of ponds needs in each metapopulation area to support a minimum viable population size of California tiger salamanders. Four ponds of this size are required to preserve a minimum viable population for each metapopulation based on calculations that are discussed in the Service's (2015) draft recovery plan. In metapopulation areas where ponds are smaller than 1.47 acres, more than 4 ponds may be needed to support the minimum viable population size because effective population size is related to pond area. For example, if ponds are 0.4 acres, then 5 ponds will be necessary to support a minimum viable population size.

To preserve the minimum viable population found in single pond, at least 623 acres of functional upland habitat around each pond is required. 623 acres of functional upland habitat encompasses approximately 75 percent of the individuals using that pond based on calculations that are discussed in the Service's 2016 recovery plan. The remaining 25 percent of the population is distributed across an additional 1,628 acres of functional upland habitat.

Compensatory mitigation should work to further meeting recovery criteria. The recovery plan (Service 2016) established the following recovery criteria to support long-term viability of the Santa Barbara County 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.

Given the different landscape context in each metapopulation area, the method in which recovery criteria will be met in each metapopulation will differ (see Table 1 below). The first priority is preservation of existing ponds, followed by restored or created ponds – metapopulations that are limited by the number of functional breeding ponds would likely require the creation of additional breeding ponds to meet the first recovery criteria as listed above.

Table 1. The six metapopulation areas of the Santa Barbara County DPS of the California Tiger Salamander and the actions the Service currently envisions are necessary to achieve recovery, including the number of breeding ponds needed to maintain a minimum viable population size (MVP). The average pond size was calculated using the geometric mean of all known breeding ponds in each metapopulation based on 2010 known California tiger salamander breeding pond data; number of breeding ponds needed to maintain an MVP was calculated as defined in Appendix A of the recovery plan (Service 2015). These calculations should be updated as new information about known breeding ponds is acquired.

Metapopulation	Number of Known Breeding Ponds	Average Size of Known Breeding Ponds (acres)	Number of Breeding Ponds Needed to Maintain an MVP	Upland habitat in fully preserved status needed (acres)	Current Recommended Recovery Actions
West Santa Maria/Orcutt	15	0.76	4	2,492	Preservation of existing ponds to conserve a minimum viable population
East Santa Maria	5	1.31	4	2,492	Prioritize preservation of existing ponds and restore those as identified in the draft recovery plan (Service 2015)
West Los Alamos	11	0.51	5	3,115	Preservation of existing ponds to conserve a minimum viable population
East Los Alamos	4	1.12	4	2,492	Pond creation will likely be necessary in this metapopulation to

					support a minimum viable population size
Purisima	19	0.42	5	3,115	Preservation of existing ponds to conserve a minimum viable population
Santa Rita	5	0.64	4	2,492	Prioritize preservation of existing ponds, restore or create ponds if necessary, and restore upland habitat as identified in the draft recovery plan (Service 2015)

3. Impacts to California tiger salamanders

For projects that have unavoidable adverse effects on California tiger salamanders and/or their habitats, compensatory mitigation is needed to conserve California tiger salamanders. The amount of compensatory mitigation to offset a proposed project's impacts should be determined by assessing a project's level of impacts to California tiger salamanders and their habitat. Impacts to California tiger salamanders result from direct mortality to individuals, loss or alteration of suitable breeding habitat, loss or alteration of suitable upland habitat, interference with breeding migration, or interference to dispersal and connectivity between metapopulations. Impacts may be permanent or temporary, direct or indirect, immediate or cumulative.

4. Mitigation to Offset Impacts

Mitigation is typically defined as avoiding, minimizing, rectifying, reducing, and then compensating for unavoidable impacts that result from a project, to a species or its habitat. Projects should incorporate conservation measures that help to avoid, reduce, or minimize impacts. Under this conservation strategy and mitigation guidance, any remaining impacts to the California tiger salamander or its habitat should be offset through compensatory mitigation undertaken in a strategic way such that the mitigation contributes to meeting the recovery criteria in the affected metapopulation. Compensatory mitigation, in this document, means physical habitat that is permanently conserved, managed, maintained, and endowed in perpetuity to ensure conservation benefits for the California tiger salamander.

5. Determining Mitigation

The Service will consider a number of primary factors when determining how much mitigation should be provided to adequately offset impacts that will be incurred by a proposed project. These primary factors are:

1. The amount of breeding habitat and/or upland California tiger salamander habitat to be directly or indirectly impacted;
2. The quality of California tiger salamander habitat to be impacted as valued through Searcy and Shaffer (2008);
3. California tiger salamander occupancy and use of the site to be impacted;
4. Number of breeding ponds within dispersal distance (1.3 miles) of the impact area;
5. Location and landscape context of the site to be impacted.

Other factors that should be taken into account by both the Service and the project proponent include: how well the proposed mitigation site supports recovery of California tiger salamander; whether the impact is temporary or permanent; and whether the proposed mitigation to offset impacts provides immediate conservation and recovery benefits to California tiger salamanders or if there will be a delay in such benefits. The Service prefers that lands to be used for mitigation already contain suitable habitat for the California tiger salamander, as opposed to lands that may need restoration or enhancement, to ensure immediate benefits to the species in exchange for proposed impacts.

6. Providing Mitigation

When a project's impact calls for compensatory mitigation, it can be provided by the project proponent by buying mitigation from a mitigation provider (mitigation bank), by paying a fee towards a Service-approved mitigation account for the California tiger salamander (mitigation account), or by establishing a mitigation site that meets the specification for approved mitigation (permittee-responsible mitigation).

Mitigation Bank

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

In order to determine how many credits an applicant must purchase, the applicant must calculate the loss of reproductive value that would result from their project. The Service has calculated the average reproductive value of one credit at approved conservation banks as a means to determine how many credits a project proponent must purchase to offset the loss in reproductive value resulting from a project. An applicant must purchase as many credits needed to reach a mitigation ratio of 1:1 for reproductive value. For example, if a credit at a conservation bank has a reproductive value of 100 and a project results in a reproductive loss of 200, that project proponent must purchase 2 credits from that bank to offset the loss in reproductive value. Project proponents that are proposing to purchase mitigation credits from a conservation bank should coordinate with the Service to ensure they are using the correct reproductive value of one credit from the conservation bank in which the project proponents proposes to purchase credits from.

For those pursuing compensatory mitigation for impacts occurring in the East and West Los Alamos, Purisima, or Santa Rita metapopulation areas, but unable or not interested in establishing and securing a mitigation site, it may be possible to pay an fee to or to purchase credits from a mitigation site or mitigation bank, each of which could result in providing California tiger salamander conservation benefits commensurate with project impacts. Paying a fee or purchasing credits both entail a payment of U.S. dollars by the entity needing to provide mitigation to a third party who will provide that mitigation. This payment is relatively simple and fast compared to permittee-responsible mitigation.

For project proponents intending to provide compensatory mitigation for impacts occurring in the East and West Los Alamos, Purisima, or Santa Rita metapopulation areas by purchasing credits from a bank, the Service will determine the quality of California tiger salamander habitat as valued through Searcy and Shaffer (2008) for each credit within the bank. The Service and Department will then use that to set the appropriate number of credits for perspective projects to purchase the required mitigation ratio (defined below under *Methodology on How to Determine Mitigation*).

California Tiger Salamander Mitigation and Conservation Account

The Service created a California tiger salamander Mitigation and Conservation Account that is intended to collect mitigation fees for impacts to the California tiger salamander that occur in the East and West Santa Maria metapopulation areas. While there are six metapopulations of the Santa Barbara County distinct population segment of the California tiger salamander, the East and West Santa Maria metapopulation areas are under the greatest threat from land conversion and habitat loss. In order to avoid precluding recovery in these metapopulation areas, mitigation for impacts in West Santa Maria and East Santa Maria should occur within these metapopulations areas. Therefore, the mitigation account pertains only to mitigation fees resulting from impacts occurring in the East and West Santa Maria Metapopulation areas and will be used for mitigation within these metapopulations. With the current prices of property, single applicants are unable to purchase land as mitigation for their projects. Therefore, a mitigation account is necessary to compile funds from multiple projects to be able to purchase parcels of land to put into conservation easements for the California tiger salamander in the Santa Maria metapopulation areas.

The Account is held, managed and administered by the National Fish and Wildlife Foundation to receive monies paid by project applicants in connection with offsetting impacts to the California tiger salamander occurring in the East and West Santa Maria metapopulations. These monies will be received as compensation for unavoidable impacts to the California tiger salamander. The types of activities for which the Account will be used include, but are not necessarily limited to: habitat restoration and enhancement; long-term protection of habitat, including establishment of conservation easements on habitat lands and/or long-term management and monitoring of habitat lands; and recovery activities. These activities will only be implemented in the East and West metapopulations for the California tiger salamander, Santa Barbara distinct population. The Service recognizes that a temporal loss may occur between a project’s impacts and implementation of compensatory mitigation. In order to minimize the extent of the temporal loss, funds should be used to implement the aforementioned activities within 5 years of the date of deposit.

In 2017, the Service calculated the reproductive value of one mitigation credit from the La Purisima Conservation Bank. At the time, one credit had a reproductive value of 850. The

Service used that number to establish a mitigation fund fee calculator to determine the mitigation fee needed to offset the loss in reproductive value resulting from a project. The Service consulted with the National Fish and Wildlife Foundation to develop a mitigation fund fee calculator (Service 2017) to account for various fees associated with establishing a conservation easement. The Service anticipates revisiting the fund fee calculator every 5 years to ensure the accuracy of the fee calculator. The calculator is based on the loss of reproductive value resulting from a project to ensure a mitigation ratio of 1:1 [as calculated in Searcy and Shaffer (2008)] is met for the impacts to California tiger salamanders and their habitats. The mitigation fund fee calculator (Service 2017) has detailed information about how mitigation fees are calculated.

Permittee-Responsible Mitigation

Applicants may acquire compensation land to satisfy compensation requirements for impacts to the California tiger salamander. Compensation land must be acquired prior to initiating ground-disturbing activities within the Planning Area and financial assurances must be provided to ensure funding for the long-term management of the compensation lands. All compensation land must be recorded, managed and maintained and endowed in perpetuity prior to the onset of ground-disturbing activities. The compensation land will conserve sufficient reproductive value, as addressed in the Conservation Strategy and Mitigation Guidance for the California tiger salamander (Service 2016), to offset the impacts to the California tiger salamander. As stated above, a mitigation ratio of 1:1 [as calculated in Searcy and Shaffer (2008)] will be required for impacts to California tiger salamanders and their habitats. In other words, the reproductive value of habitat proposed for mitigation should equal the calculated reproductive value of the impacted habitat. When potentially suitable compensation land is identified, the applicant will prepare and submit a report to the Service outlining the suitability of the land for compensatory purposes. Once the Service agrees to the suitability of the compensatory land and the land is placed into conserved status, the performance and success criteria for the provision of onsite compensation lands will be deemed to have been met.

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

For those establishing a mitigation site to provide their own mitigation or to establish a bank, it will be necessary to work with the Service to ensure approval of key elements needed to authorize the mitigation site. The Service will provide detailed guidance and feedback on each of the following key elements:

1. Identifying a land parcel(s) adequate for providing compensatory mitigation.
2. Recording a permanent conservation easement on the property.
3. Developing a management plan for the property that documents baseline conditions. A management plan will establish biological goals, objectives, and performance standards, prescribe monitoring and reporting, and provide for adaptive management.
4. Providing financial assurances (specifically, an endowment) for the interim and perpetual maintenance, management, and monitoring of the mitigation site property.
5. Private parties must obtain an Incidental Take Permit (i.e., Section 10 permit pursuant to the Act) or otherwise be covered by an existing permit. This occurs in part by developing a Habitat Conservation Plan (HCP) or being covered by an existing conservation plan. For additional information on HCPs, see: http://www.fws.gov/endangered/what-we-do/hcp-overview.html
6. Federal agencies should complete a consultation (pursuant to section 7 of the Act) in which the proposed project action includes compensatory mitigation to offset impacts California tiger salamanders or their habitat.

7. Siting Mitigation

For all circumstances, mitigation for impacts to California tiger salamanders and its habitat should occur at a location within the affected California tiger salamander metapopulation unless otherwise determined by the Service. In general, large sites functionally connected to other permanently conserved lands are preferred for mitigation as they would likely contribute the greatest toward meeting recovery criteria. Within each metapopulation, compensatory mitigation should be directed to areas encompassing known breeding ponds and their associated upland habitat that contribute in the greatest extent to meeting the aforementioned recovery criteria. Mitigation should be steered away from ponds that are isolated from other ponds in a metapopulation area and/or that do not have sufficient functional upland habitat to support long-term viability of a metapopulation. Proposed mitigation areas should be located within areas that are capable of supporting a minimum viable population of California tiger salamanders. As specified in the Service’s 2016 recovery plan, a minimum of 623 acres of functional upland habitat around a preserved pond is necessary to support a minimum viable population. Mitigation areas must be evaluated and approved by the Service to qualify as mitigation for proposed impacts to California tiger salamanders.

All areas approved for mitigation must be placed into fully preserved status. Fully preserved status is either: (1) owned in fee title by an agency or conservation organization; or, (2) privately-owned lands protected in perpetuity with conservation easements. These lands must have funding secured for long-term management and monitoring. Parcels will be legally and permanently conserved, managed, and endowed to help ensure their long-term ecological value, in a manner consistent with the Service's 2003 Conservation Banking guidance and the Service's most current recommendations for implementing that guidance specific to federally-listed species conservation.

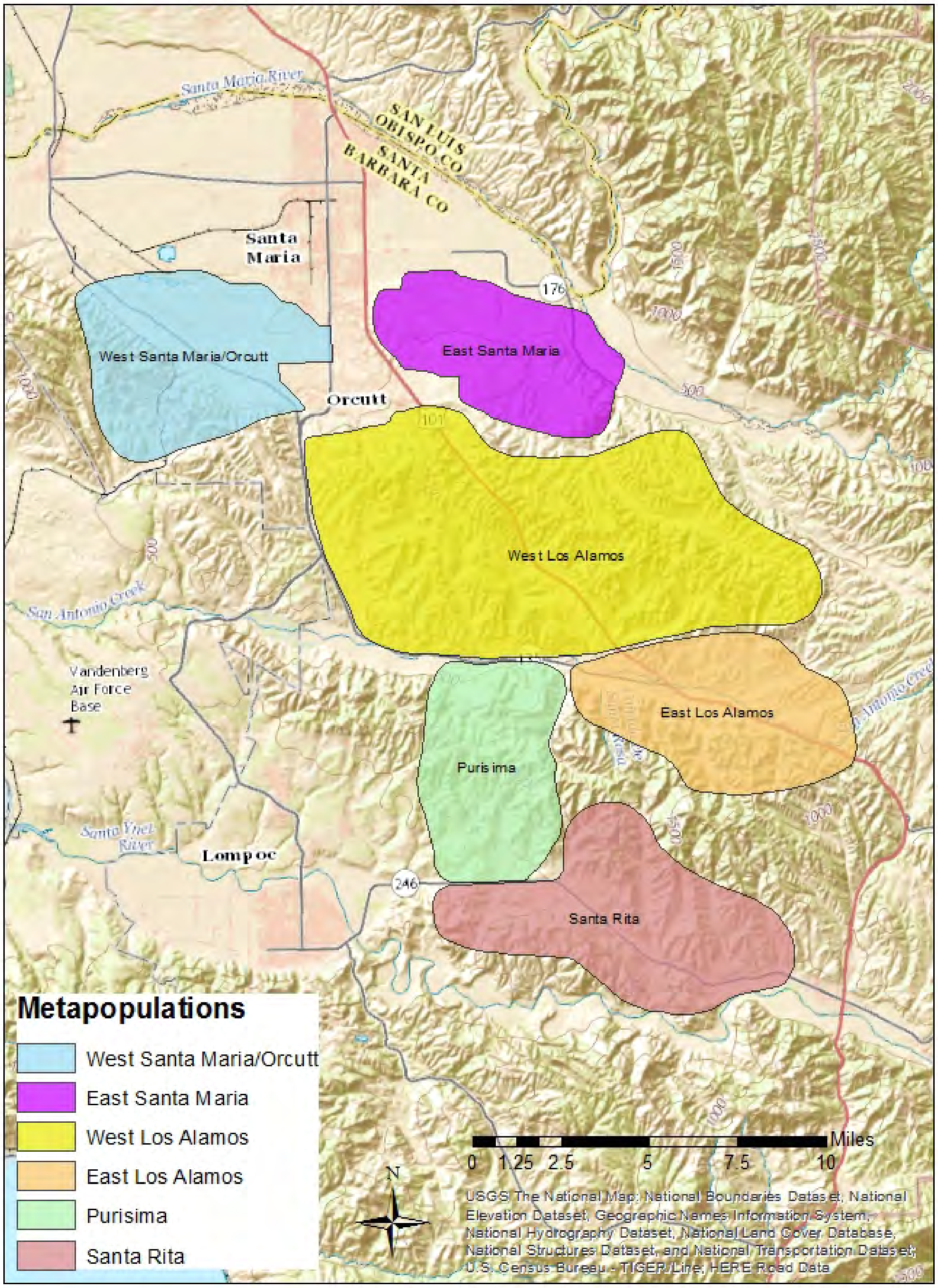
For impacts occurring outside the six metapopulations, mitigation efforts should be directed to the closest defined metapopulation. The Service will evaluate impacts occurring outside of the six metapopulations and provide recommendations and guidance on where compensatory mitigation should be directed on a case-by-case basis. The different metapopulations within Santa Barbara County are shown by different colors on the map located on the following page. These six metapopulations were delineated by the Service upon consideration of the range of the Santa Barbara County DPS of California tiger salamander and are defined by a series of interconnected breeding and upland habitat. These metapopulations could be refined in the future as biological information, recovery needs, and land uses change. We believe that siting mitigation in and adjacent to other parcels that are conserved and managed for similar upland ecosystem functions and values can be advantageous both ecologically and economically.

Proposed mitigation areas outside the areas that are capable of supporting a minimum viable population of California tiger salamanders will be considered on a case-by-case basis. Under this scenario, mitigation proposals would likely incur a longer review process and may be subjected to additional requirements, including greater mitigation ratios.

8. Translocation

Translocation involves the human-mediated movement of animals from one area, with release in another. Techniques for successful California tiger salamander translocation are not refined at this time, and there is currently little data on the conservation value of California tiger salamander translocation to the species. In general, we do not consider the translocation of California tiger salamanders for the purposes of removing an individual out of harm's way appropriate mitigation at this time. Since California tiger salamander translocation is not presently viewed as a viable mitigation option by the Service, translocation will occur at the discretion and authorization of the Service on a case-by-case basis. Translocation may be appropriate when recovery or research objectives are likely to be met (i.e., when reestablishing a local population or restocking a breeding pond). A translocation proposal must be submitted to the Service for evaluation and approval prior to any potential translocation of California tiger salamanders.

Santa Barbara County Disting Population Segment of the California Tiger Salamander



<u>Methodology on How to Determine Mitigation</u>

This section describes the methodology on how to determine the estimated impacts to the Santa Barbara County DPS of the California tiger salamander and amount of compensatory mitigation needed so that project development can move forward where appropriate. Our application of these methods will depend on our evaluation of project-specific conditions. We have considered these methods specifically for use in projects impacting the Santa Barbara County DPS of the California tiger salamander; however, they may have applicability elsewhere.

- The value of the impacted habitat should be calculated using the methodology outlined in Searcy and Shaffer (2008), incorporating the amount of California tiger salamander aquatic breeding habit and upland habitat covering the site to be impacted.

- The value of the land proposed for mitigation habitat should be calculated using Searcy and Shaffer (2008). Typically, a mitigation ratio of 1:1 will be required for impacts to California tiger salamanders and their habitats. Habitat proposed for mitigation should have an equal calculated value of the reproductive value of the impacted habitat. Additionally, habitat proposed for mitigation should be placed into a permanent conservation status.

The method described in Searcy and Shaffer (2008) attaches a value to habitat that scales with the reproductive value of the individuals estimated to be occupying an area.

According to Searcy and Shaffer (2008) the reproductive value of a site is a function of:

a. Distance from each breeding pond within dispersal distance of the site, and
b. Land-use in the surrounding areas.

The density distribution of reproductive value decreases exponentially with increasing distance from a breeding site and decreases with increasing habitat loss in the surrounding uplands. For example, parcels close to a breeding pond, or several ponds, with intact upland habitat in the surrounding area will have a higher reproductive value than those with one pond where upland habitat has been converted to a use that is incompatible with California tiger salamanders.

Studies have recorded migration and dispersal distances by adult and juvenile California tiger salamanders, both through radio-tracking (Loredo et al. 1996, Trenham 2001) and upland drift fence capture (Trenham and Shaffer 2005, Orloff 2007, Orloff 2011). None of these studies were conducted within the range of the Santa Barbara County DPS of the California tiger salamander but are considered to be the best available scientific information on the species. Movement of California tiger salamanders is reviewed in Service (2009) and Searcy et al. (2013). In general, adults may migrate up to 1.2 miles (6,336 feet; 2 kilometers) from upland habitats to aquatic breeding sites (Service 2000). Orloff (2011) found that a considerable number of adult and juvenile California tiger salamanders moved more than 2,625 feet (800 meters) from their breeding pond, and some more than 1.4 miles (7,392 feet; 2.2 kilometers). Based on studies at Jepson Prairie (Central DPS), researchers estimated that California tiger salamanders use a much greater area around the pond, as compared to Trenham and Shaffer's (2005) original 2,200-foot (670-meter) estimate, with 95 percent of salamanders found within 1.1 miles (5,587 feet; 1.7 kilometers) of a breeding pond from the most outlying pool edge (Searcy and Shaffer 2008, 2011, Searcy et al. 2013, Service 2015).

The location of a site within, or outside, a metapopulation area affects the site's relative importance to the persistence and recovery of California tiger salamanders. Areas capable of supporting a minimum viable population are those geographies with potential for conservation of upland habitat of at least 623 acres around known breeding ponds. Thus, mitigation should be steered away from ponds that are isolated from other ponds in the metapopulation area and/or that do not have sufficient functional upland habitat to support long-term viability of the population. Mitigation should be applied in a strategic way such that it contributes toward meeting recovery criteria in the metapopulation area where the project occurs.

Methodology for Calculating Permanent vs. Temporary Impacts

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

In calculating mitigation owed for impacts to listed species and/or the habitat that supports them, temporary impacts are of a different nature than permanent impacts. Therefore, mitigation for permanent and temporary should be calculated differently. Permanent impacts should be calculated using the methodology outlined in Searcy and Shaffer (2008), as described above. The deficit wedge (shadow) described above is only created by permanent or long-term impacts that impede California tiger salamander that are dispersing across the landscape. For temporary impacts occurring over one dry season (approximately May to October), there is no shadow because there is no habitat that becomes isolated during migration or dispersal. Calculating mitigation owed for temporary impacts only includes the direct loss of habitat within the project footprint where the impact to habitat occurs.

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

Years of Disturbance	Percent of Deficit Wedge to Mitigate
1	20
2	40
3	60
4	80
5	100

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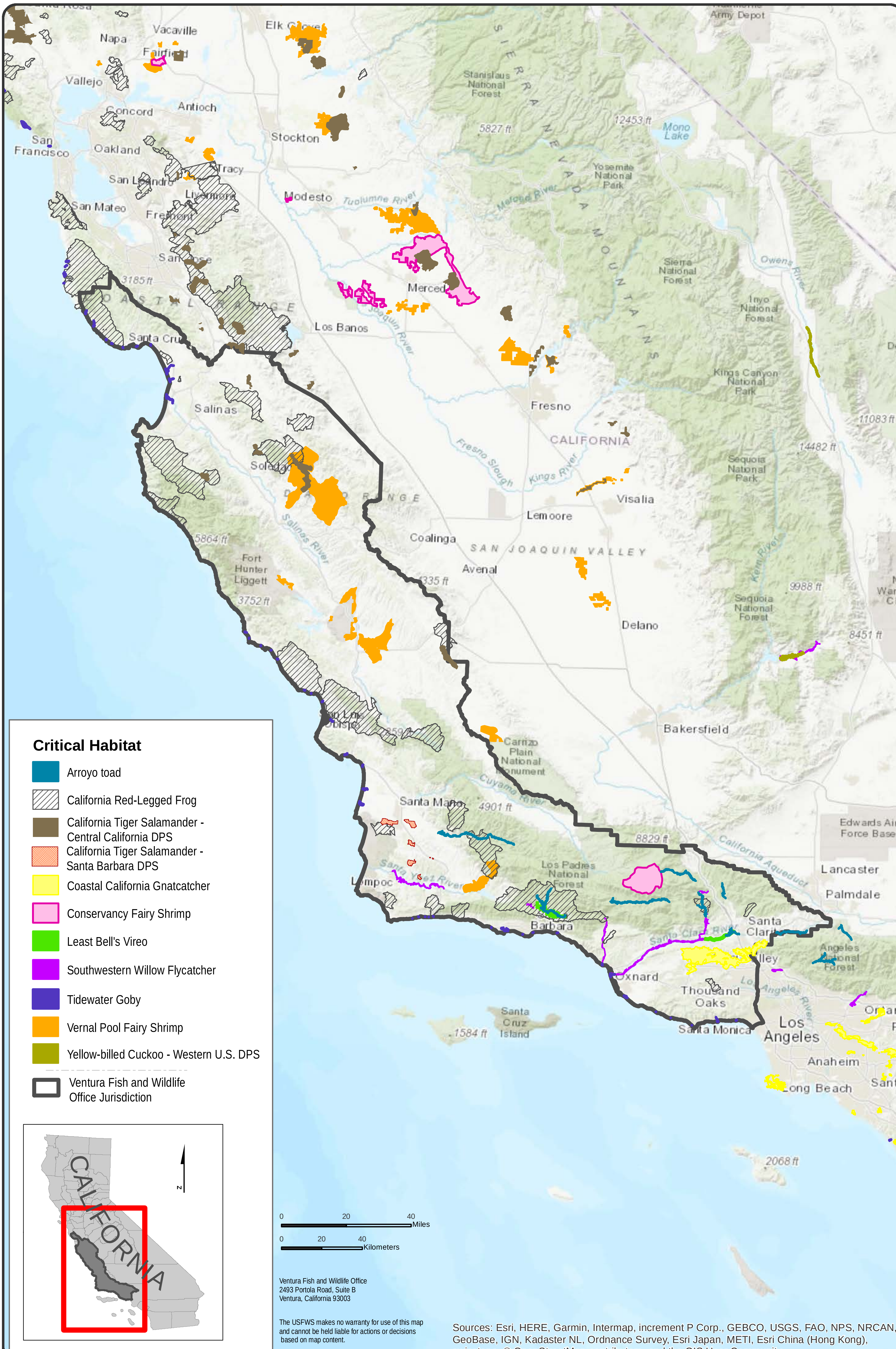
Appendix E

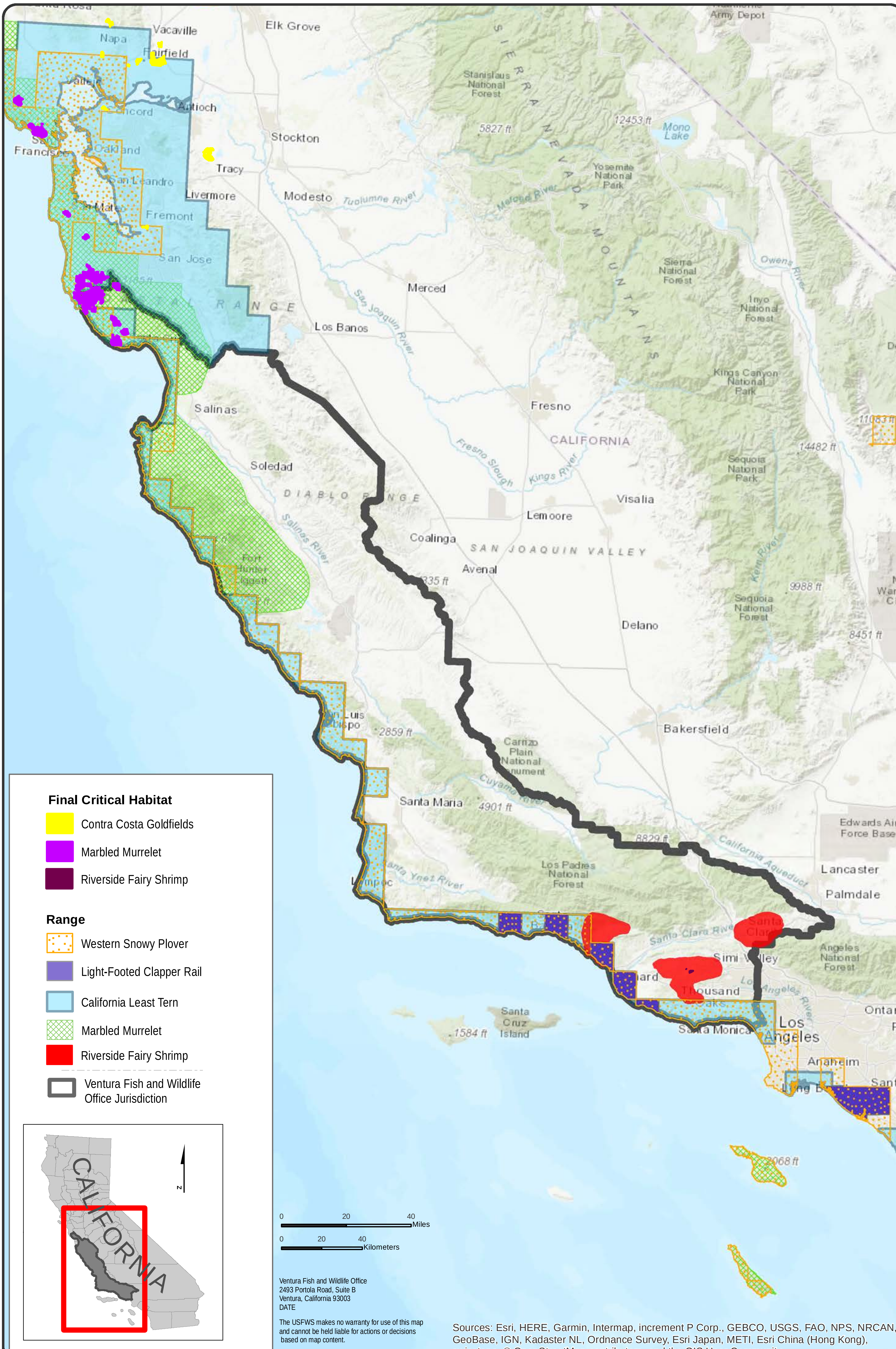
Range Maps for Species Covered in this Section 7 Consultation

U.S. Fish & Wildlife Service

Distribution of Species - Critical Habitat

Ventura Fish and Wildlife Office




Final Critical Habitat
Contra Costa Goldfields
Marbled Murrelet
Riverside Fairy Shrimp
Range
Western Snowy Plover
Light-Footed Clapper Rail
California Least Tern
Marbled Murrelet
Riverside Fairy Shrimp
Ventura Fish and Wildlife Office Jurisdiction
CALIFORNIA
0 20 40 Miles
0 20 40 Kilometers
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003
DATE
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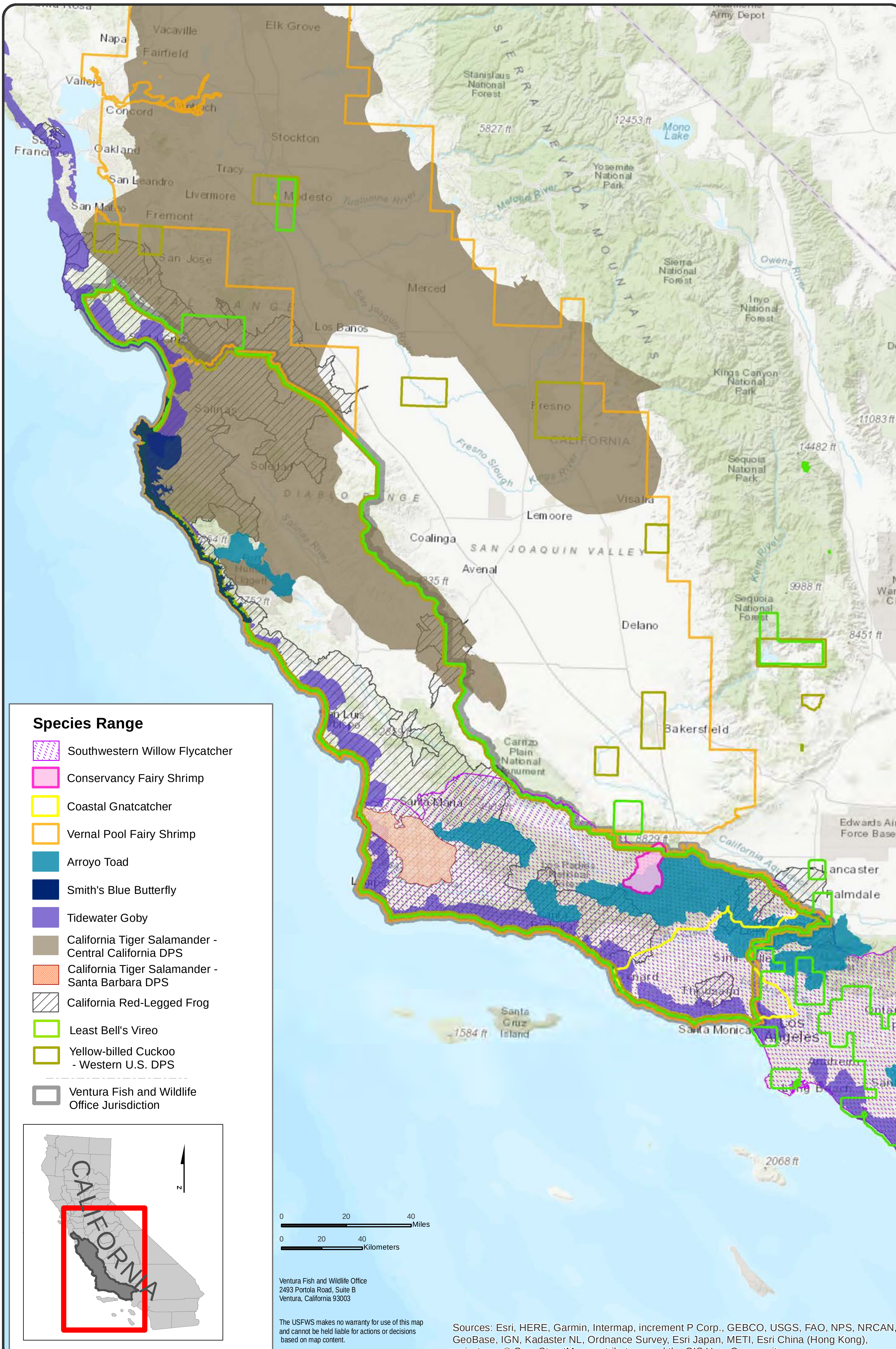
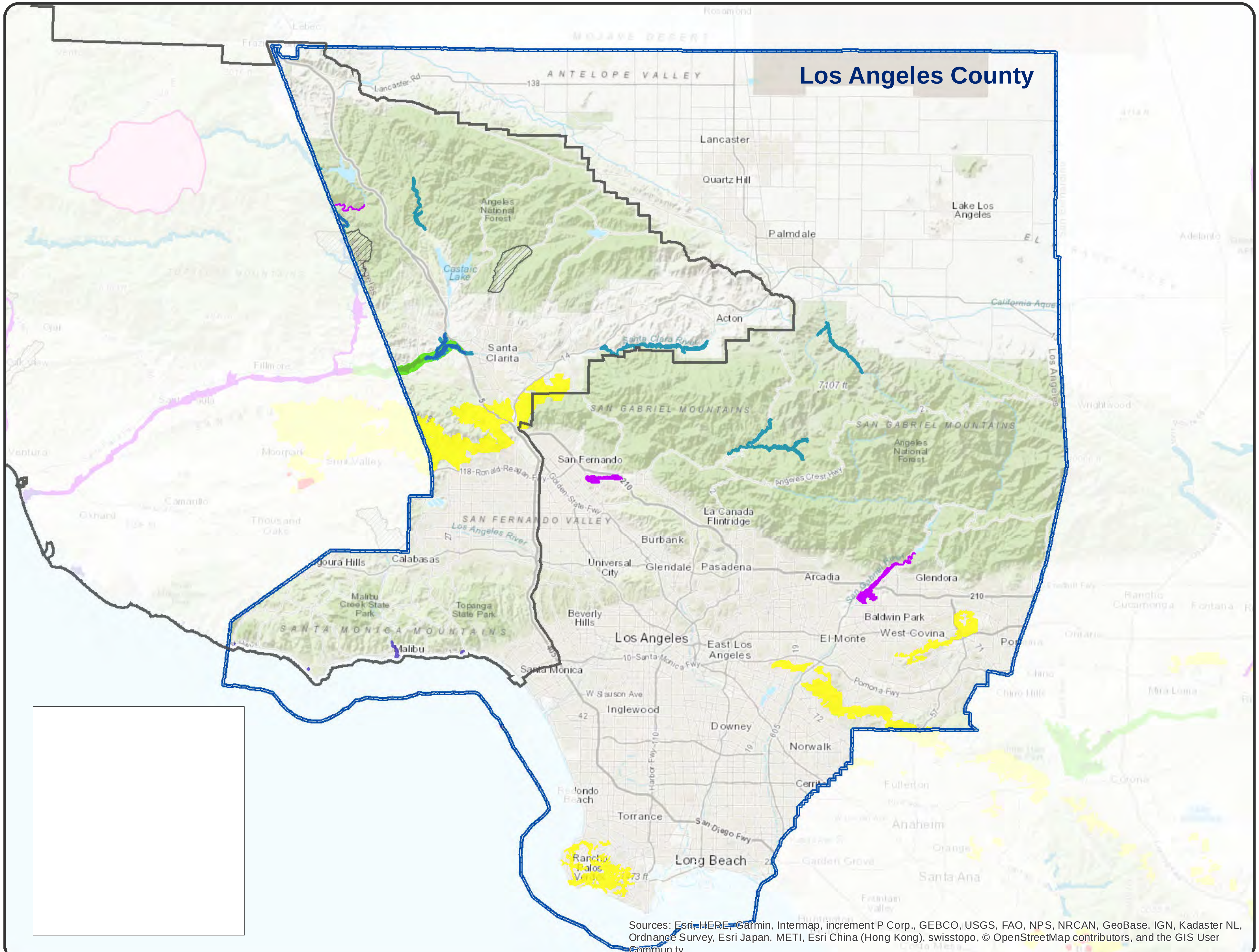
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community
Vacaville
Napa
Fairfield
Elk Grove
Antioch
Stockton
Oakland
Tracy
San Leandro
Livermore
Modesto
Fremont
San Jose
Merced
Los Banos
Salinas
Fresno
CALIFORNIA
Soledad
Visalia
Lemoore
Coalinga
SAN JOAQUIN VALLEY
Avenal
Delano
Bakersfield
Santa Maria
Lancaster
Palmdale
Simi Valley
Thousand Oaks
Santa Monica
Los Angeles
Anaheim
Santa Cruz Island
Stanislaus National Forest
Yosemite National Park
Sierra National Forest
Inyo National Forest
Kings Canyon National Park
Sequoia National Park
Sequoia National Forest
Los Padres National Forest
Angeles National Forest
Edwards Air Force Base
Mono Lake
SIERRA NEVADA MOUNTAINS
DIABLO RANGE

U.S. Fish & Wildlife Service

Distribution of Species - Range

Ventura Fish and Wildlife Office





U.S. Fish & Wildlife Service

Los Angeles County

Critical Habitat

- Arroyo Toad
- California Red-Legged Frog
- Coastal California Gnatcatcher
- Least Bell's Vireo
- Tidewater Goby
- Southwestern Willow Flycatcher

- Ventura Fish and Wildlife Office Jurisdiction
- Los Angeles County

0 10 20 Miles

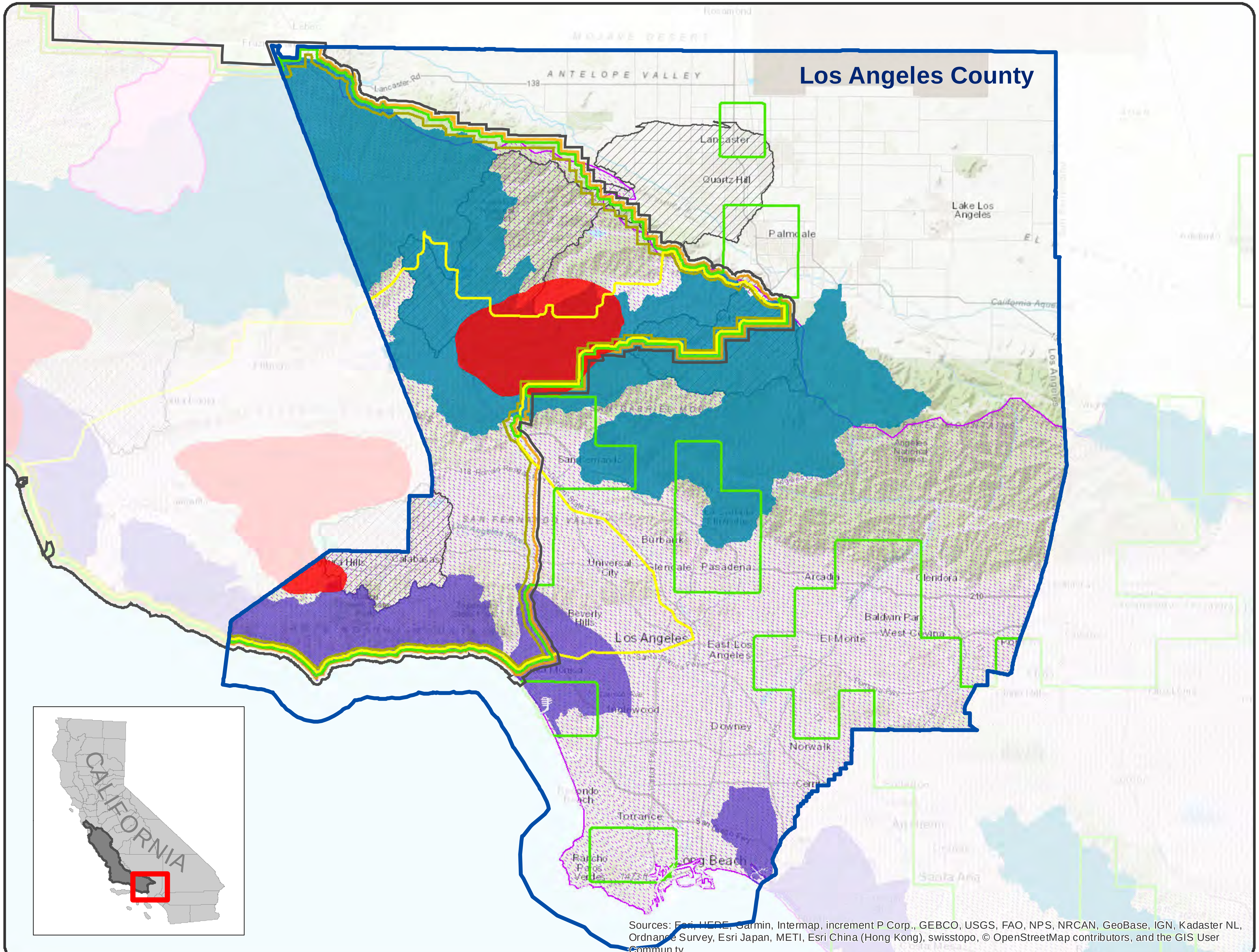
0 10 20 Kilometers

Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

N

U.S. Fish & Wildlife Service

Los Angeles County



Species Range

- Riverside Fairy Shrimp
- Coastal Gnatcatcher
- Vernal Pool Fairy Shrimp
- Arroyo Toad
- Tidewater Goby
- California Red-Legged Frog
- Least Bell's Vireo
- Southwestern Willow Flycatcher
- Yellow-billed Cuckoo - Western U.S. DPS

- Ventura Fish and Wildlife Office Jurisdiction
- Los Angeles County

0 10 20 Miles

0 10 20 Kilometers

Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

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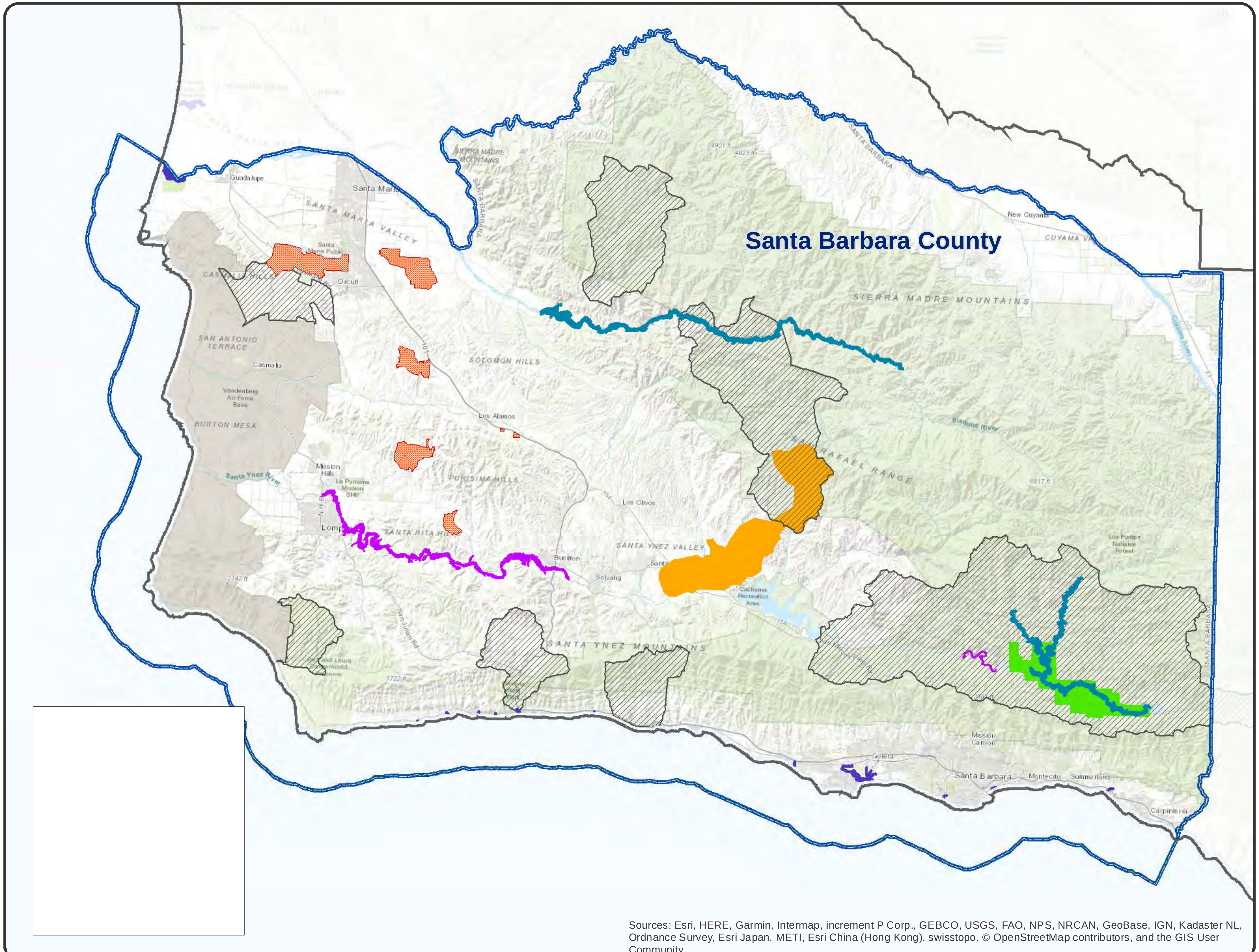

U.S. Fish & Wildlife Service

Santa Barbara County

Critical Habitat

- Arroyo Toad
- California Red-Legged Frog
- Least Bell's Vireo
- Tidewater Goby
- Vernal Pool Fairy Shrimp
- California Tiger Salamander - Santa Barbara DPS
- Southwestern Willow Flycatcher

- Ventura Fish and Wildlife Office Jurisdiction
- Santa Barbara County

0 5 10 Miles

0 10 20 Kilometers

Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

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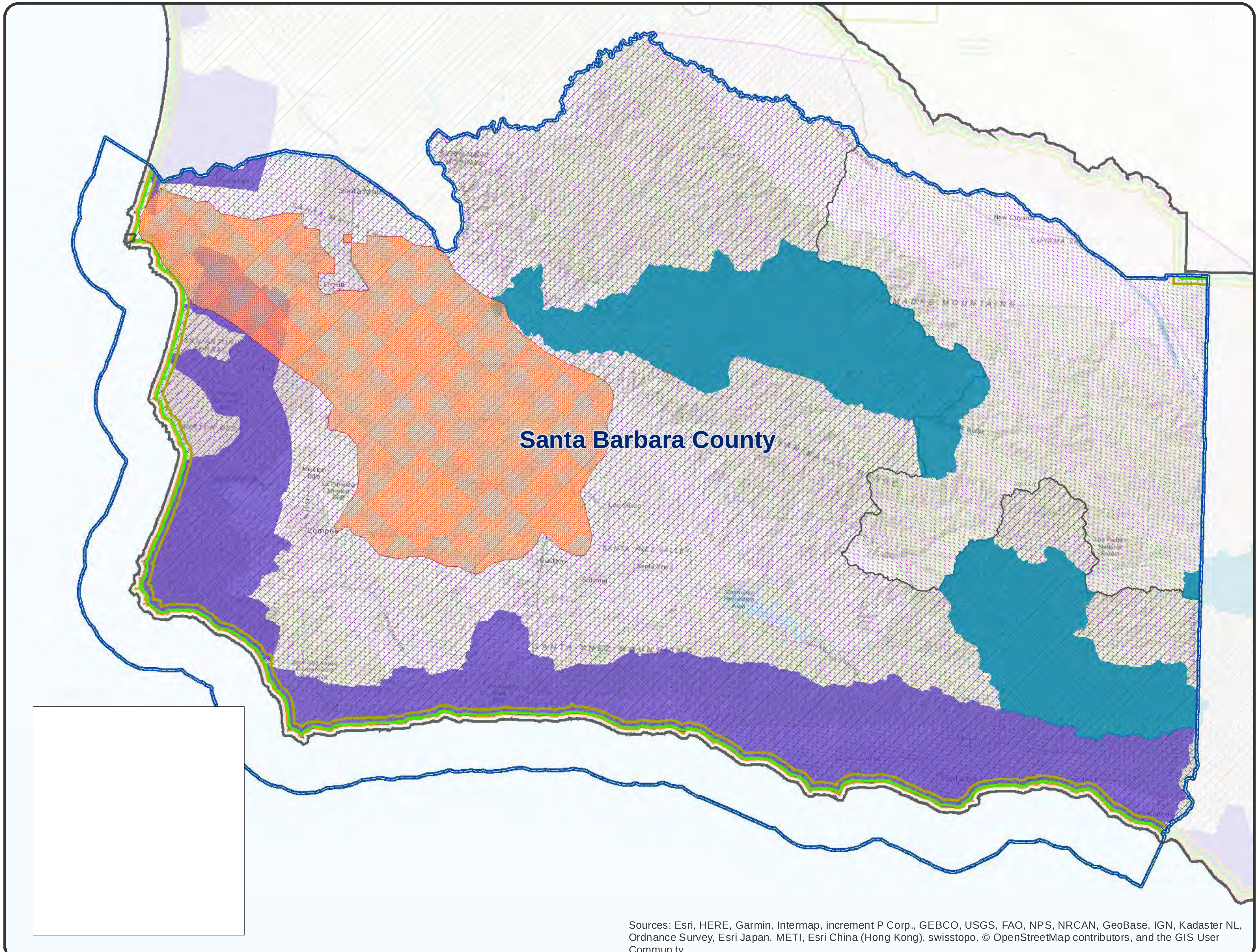

U.S. Fish & Wildlife Service

Santa Barbara County

Species Range

- Vernal Pool Fairy Shrimp
- Arroyo Toad
- Tidewater Goby
- California Red-Legged Frog
- Least Bell's Vireo
- Southwestern Willow Flycatcher
- Yellow-billed Cuckoo - Western U.S. DPS
- California Tiger Salamander - Santa Barbara DPS

- Ventura Fish and Wildlife Office Jurisdiction
- Santa Barbara County

0 5 10 Miles

0 10 20 Kilometers

Ventura Fish and Wildlife Office
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Ventura, California 93003
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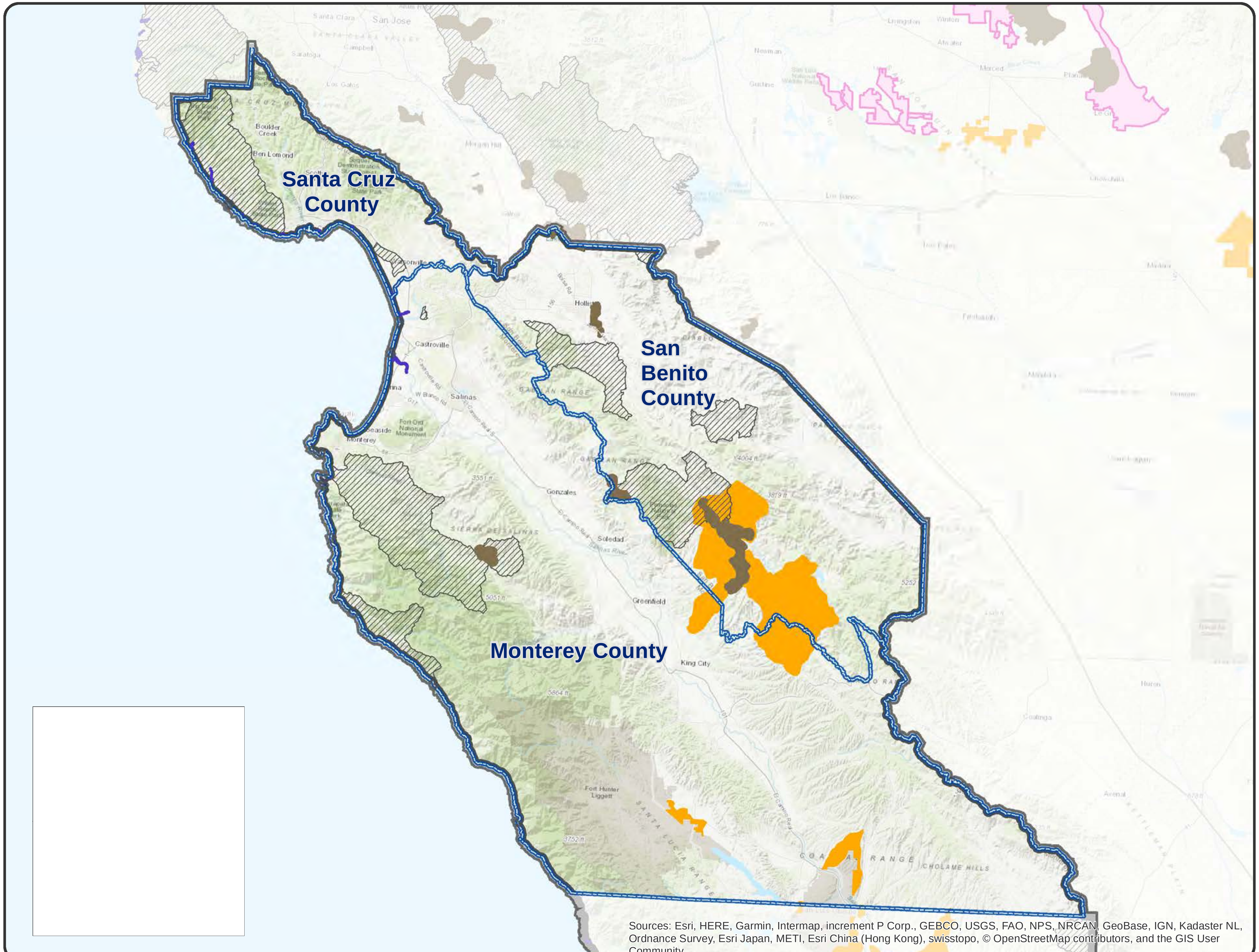

U.S. Fish & Wildlife Service

Monterey, San Benito, and Santa Cruz Counties

Critical Habitat

- California Red-Legged Frog
- California Tiger Salamander - Central California DPS
- Conservancy Fairy Shrimp
- Tidewater Goby
- Vernal Pool Fairy Shrimp

- Ventura Fish and Wildlife Office Jurisdiction
- Monterey, San Benito, and Santa Cruz Counties

0 10 20 Miles

0 10 20 Kilometers

Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

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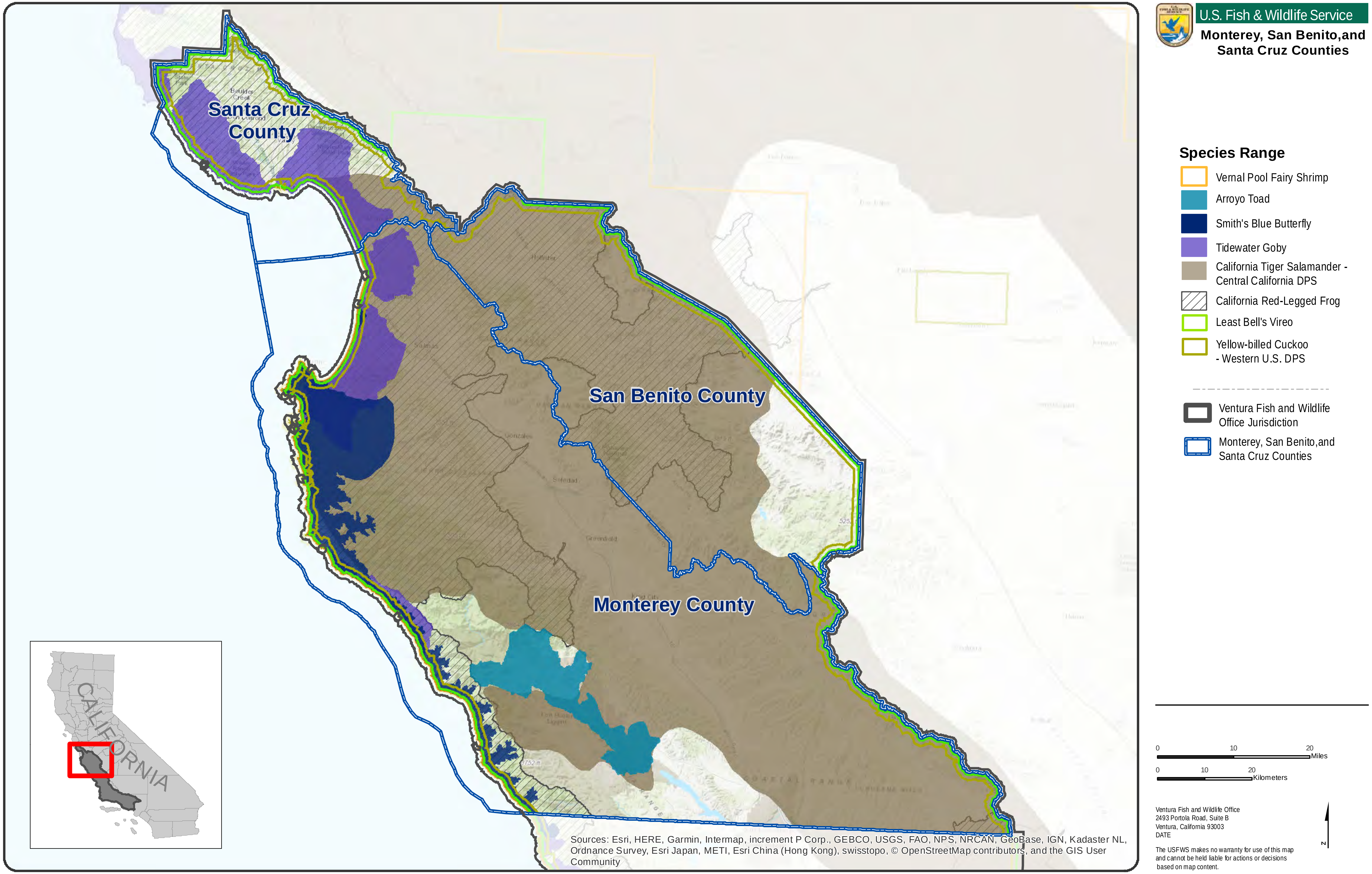
U.S. Fish & Wildlife Service
Monterey, San Benito,and Santa Cruz Counties
Species Range
Vernal Pool Fairy Shrimp
Arroyo Toad
Smith's Blue Butterfly
Tidewater Goby
California Tiger Salamander - Central California DPS
California Red-Legged Frog
Least Bell's Vireo
Yellow-billed Cuckoo - Western U.S. DPS
Ventura Fish and Wildlife Office Jurisdiction
Monterey, San Benito,and Santa Cruz Counties
Santa Cruz County
San Benito County
Monterey County
CALIFORNIA
0 10 20 Miles
0 10 20 Kilometers
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community
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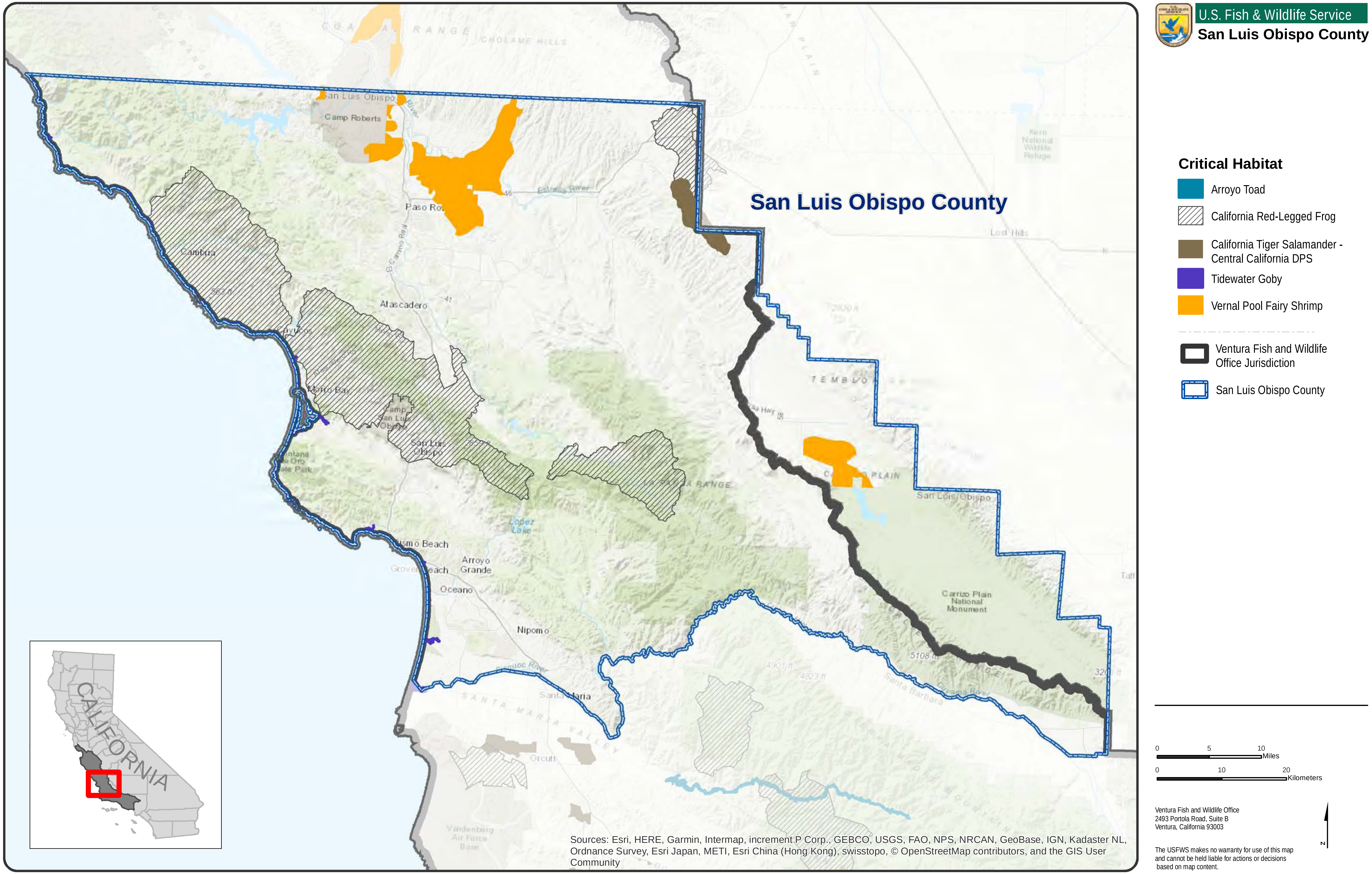
U.S. Fish & Wildlife Service
San Luis Obispo County
San Luis Obispo County
Critical Habitat
Arroyo Toad
California Red-Legged Frog
California Tiger Salamander - Central California DPS
Tidewater Goby
Vernal Pool Fairy Shrimp
Ventura Fish and Wildlife Office Jurisdiction
San Luis Obispo County
0 5 10 Miles
0 10 20 Kilometers
Ventura Fish and Wildlife Office
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Ventura, California 93003
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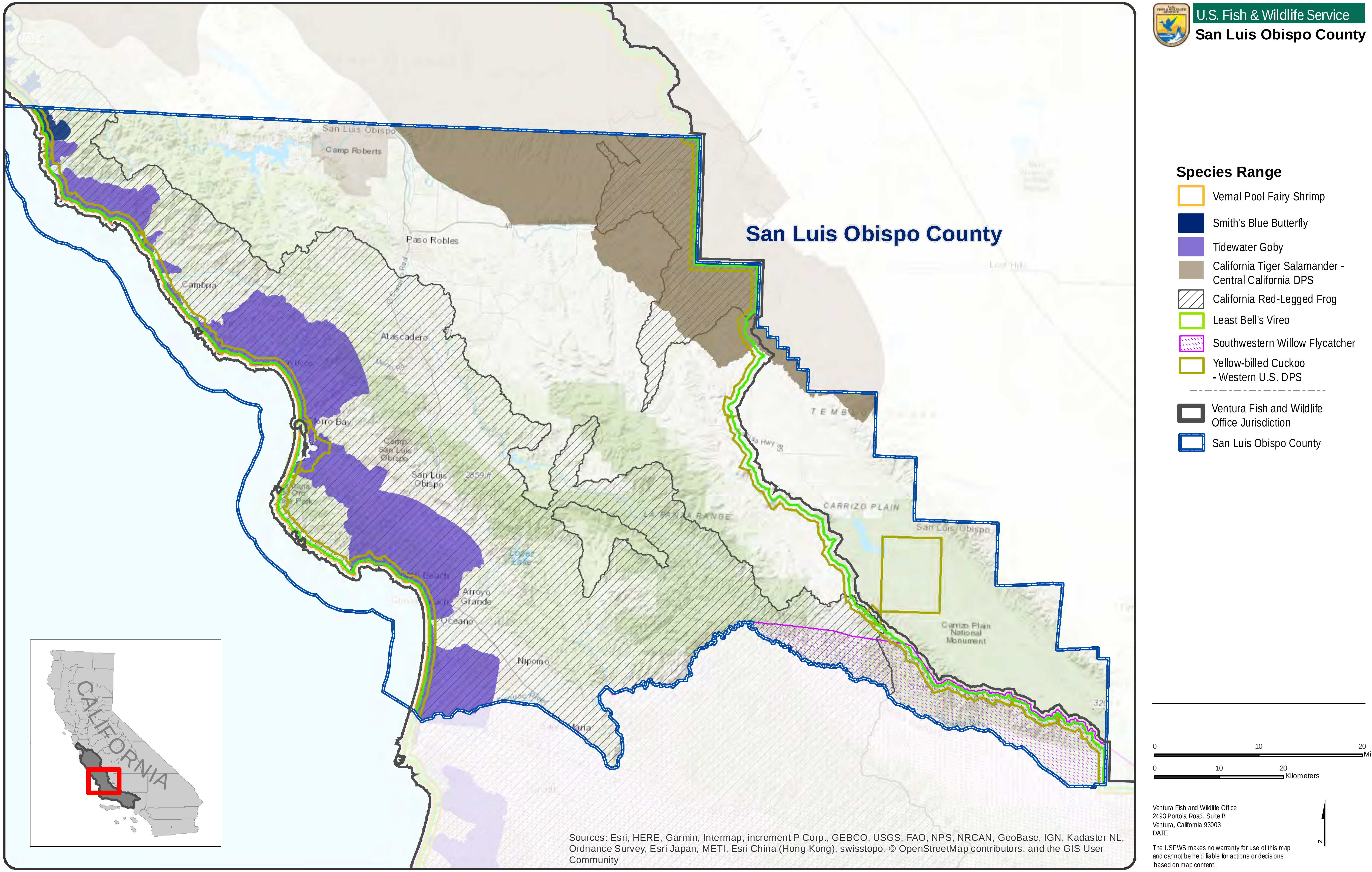
CALIFORNIA
Camp Roberts
Paso Robles
Cambria
Atascadero
Morro Bay
San Luis Obispo
Pismo Beach
Arroyo Grande
Oceano
Nipomo
Santa Maria
Lost Hills
Carrizo Plain National Monument
Estrella River
Lopez Lake
Cuyama River
SANTA MARIA VALLEY



U.S. Fish & Wildlife Service
San Luis Obispo County
San Luis Obispo County
Species Range
Vernal Pool Fairy Shrimp
Smith's Blue Butterfly
Tidewater Goby
California Tiger Salamander - Central California DPS
California Red-Legged Frog
Least Bell's Vireo
Southwestern Willow Flycatcher
Yellow-billed Cuckoo - Western U.S. DPS
Ventura Fish and Wildlife Office Jurisdiction
San Luis Obispo County
Camp Roberts
Paso Robles
Cambria
Atascadero
Morro Bay
Camp San Luis Obispo
San Luis Obispo
La Panza Range
Carrizo Plain
Carrizo Plain National Monument
Arroyo Grande
Oceano
Nipomo
CALIFORNIA
0 10 20 Miles
0 10 20 Kilometers
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community
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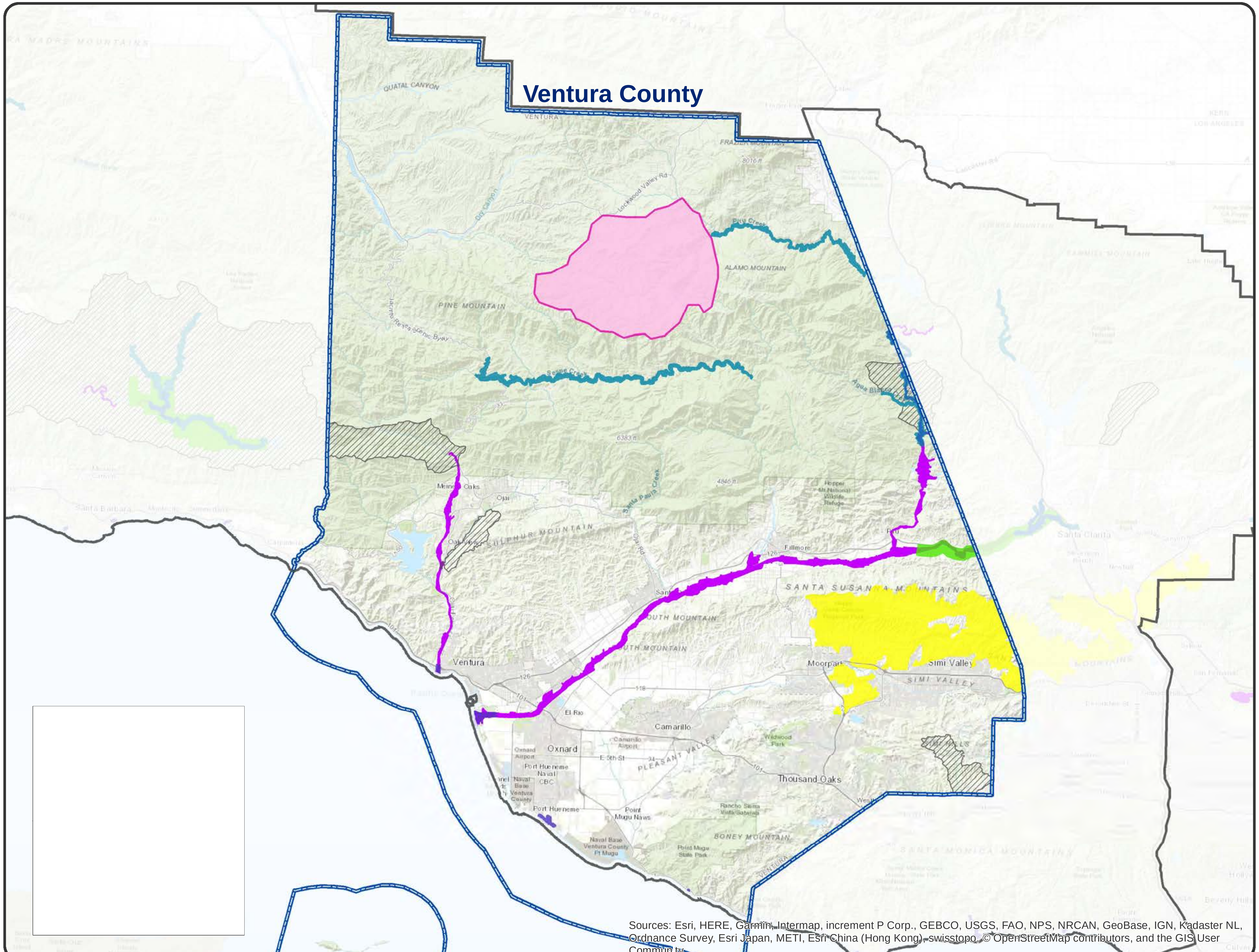

U.S. Fish & Wildlife Service

Ventura County

Critical Habitat

- Arroyo toad
- California red-legged frog
- Coastal California gnatcatcher
- Conservancy fairy shrimp
- Least Bell's vireo
- Tidewater goby
- Southwestern Willow Flycatcher

- Ventura Fish and Wildlife Office Jurisdiction
- Ventura County

0 5 10 Miles

0 10 20 Kilometers

Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

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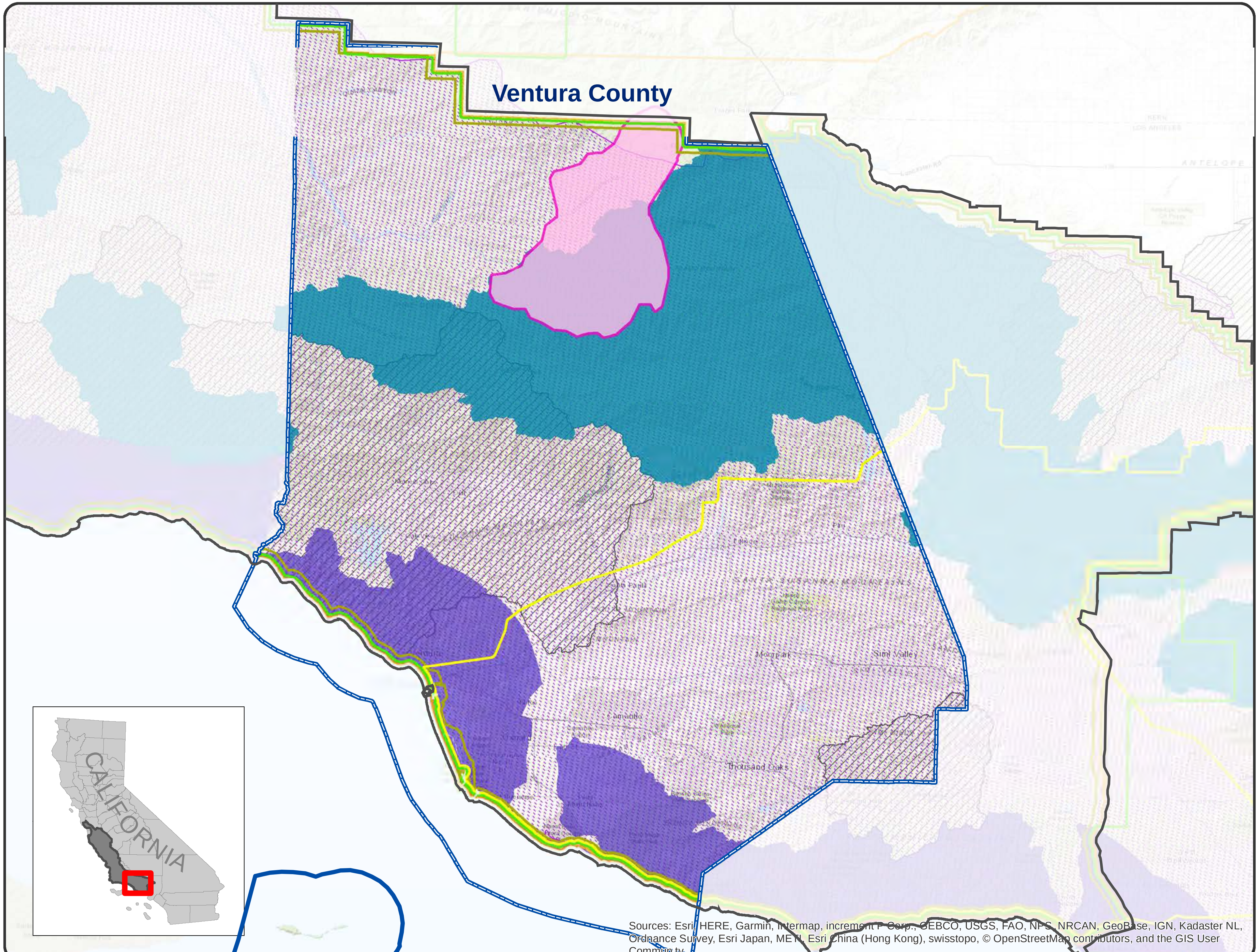
Ventura County



Species Range

- Conservancy Fairy Shrimp
- Coastal Gnatcatcher
- Vernal Pool Fairy Shrimp
- Arroyo Toad
- Tidewater Goby
- California Red-Legged Frog
- Least Bell's Vireo
- Southwestern Willow Flycatcher
- Yellow-billed Cuckoo - Western U.S. DPS

- Ventura Fish and Wildlife Office Jurisdiction
- Ventura County

0 5 10 Miles

0 10 20 Kilometers

N

Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003
DATE

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Carlsbad USFWS FEMA Programmatic Agreement

Biological Opinion

United States Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

In Reply Refer To:
FWS-CFWO-16B0293-18F1358

May 31, 2019
Sent by Email

Federal Emergency Management Agency
Department of Homeland Security
1111 Broadway, Suite 1200
Oakland, California 94607

Subject: Section 7 Consultation on FEMA Disaster, Mitigation and Preparedness Programs in Imperial, Inyo, Kern, Los Angeles, Orange, Riverside, San Bernardino, and San Diego Counties, California

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion on the Federal Emergency Management Agency's (FEMA) proposed Disaster, Mitigation and Preparedness programs in California and its effects on the federally endangered Quino checkerspot butterfly (*Euphydryas editha quino*; Quino), arroyo toad (*Anaxyrus californicus*), and least Bell's vireo (*Vireo bellii pusillus*; vireo); the federally threatened Santa Ana sucker (*Catostomus santaanae*; sucker) and coastal California gnatcatcher (*Polioptila californica californica*; gnatcatcher); and associated critical habitats for these species, in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq*.). We received your request for formal consultation and biological assessment on June 21, 2018. This biological opinion is primarily based on that biological assessment. The project file for this consultation is located at the Carlsbad Fish and Wildlife Office (CFWO[1]).

Your agency also determined that the proposed action was not likely to adversely affect the federally endangered southwestern willow flycatcher (*Empidonax traillii extimus*), California least tern (*Sternula antillarum browni*) or light-footed Ridgway's rail (*Rallus obsoletus levipes (R. longirostris levipes*) or the federally threatened western snowy plover (*Charadrius nivosus nivosus*) and requested our concurrence. We have determined that the proposed action is not likely to adversely affect these species as documented in Appendix A. Also, while you requested formal consultation for the federally endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*), Riverside fairy shrimp (*Streptocephalus woottoni*), and tidewater goby (*Eucyclogobius newberryi*), 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.

[1] CFWO includes the Carlsbad Fish and Wildlife Office and Palm Springs Fish and Wildlife Office

CONSULTATION HISTORY

On June 21, 2018, we received a request for section 7 consultation on the proposed action.

On July 17, 2018, we provided a letter documenting initiation of formal consultation as of June 21, 2018.

On December 20, 2018, we provided a draft biological opinion to FEMA for review and comment. Comments were received on March 6, 2019, and have been addressed or incorporated into this final biological opinion.

Endangered Species Act Compliance Process

This consultation relies on a two-tiered process, which includes this programmatic biological opinion and follow-up documentation to complete the section 7 consultation for each individual project addressed by the programmatic biological opinion. A description of this process is as follows:

1. If FEMA makes a no effect determination for a subapplicant's proposed project, no notification or consultation with the Service is required.

2. If FEMA makes a not likely to adversely affect determination for a subapplicant's proposed project, then FEMA will submit a completed *Act Review Form* and request concurrence from the CFWO.

    a. If the CFWO concurs with the not likely to adversely affect determination, a response to FEMA will be provided in writing within 30 days confirming that the activity is addressed and concluded by this section 7 consultation.

    b. If the CFWO does not concur with the not likely to adversely affect determination, then FEMA may resubmit the project with additional avoidance and minimization measures tailored to the specific project, or they may request formal consultation and resubmit the *Act Review Form*.

3. If FEMA makes a likely to adversely affect determination for a subapplicant's proposed project, then FEMA will submit a completed *Act Review Form* to the CFWO and request confirmation that the project is consistent with this biological opinion. The CFWO will then take one of the following actions:

    a. If the CFWO agrees that the project is consistent with the biological opinion, confirmation to FEMA will be provided in writing, including a specific incidental take statement (if applicable) for the proposed project;

    b. If the CFWO agrees that the project can be addressed by the biological opinion provided the subapplicant implements additional conservation measures tailored to the specific project, confirmation to FEMA will be provided in writing, including the conservation measures and a specific incidental take statement (if applicable) for the proposed project; or

c. If the CFWO does not agree that the proposed project is consistent with the biological opinion and/or determines that incidental take is likely but is beyond that addressed by the associated incidental take statement and provides this determination to FEMA in writing; FEMA will then prepare a separate consultation request for that subapplicant's proposed project.

4. This biological opinion does not cover emergency consultations or FEMA's implementation of the National Flood Insurance Program.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

FEMA proposes the funding of grant programs related to disaster, mitigation, and preparedness in California over the next 5 years. The following subsections generally describe the actions that FEMA may fund as part of the Proposed Action.

Non-Emergency Debris Removal

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

1. 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;

2. Removing woody debris and other vegetation following events that damage or destroy trees;

3. Removing rock and earth from landslides caused by events such as earthquakes or heavy rains; and

4. Removing rubble after earthquakes.

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. Woody debris and construction materials can be recycled if recycling facilities exist.

Constructing, Modifying, or Relocating Facilities

Relevant actions include:

1. Upgrading or otherwise modifying structures;
2. Providing temporary facilities;
3. Acquiring and demolishing existing facilities;
4. Repairing, realigning, or otherwise modifying roads, trails, utilities, and rail lines;
5. Constructing new facilities or relocating existing facilities;
6. Relocating the function of an existing facility; and
7. Developing demonstration projects.

Upgrading or Otherwise Modifying Facilities

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 will include:

1. Making structures more fire-resistant (e.g., by replacing roofs and doors with fire-resistant materials);
2. Installing bracing, shear panels, shear walls, anchors, or other features so that structures are better able to withstand seismic events or high wind or snow loads;
3. Modifying structures to reduce the risk of damage during floods by elevating structures above the expected flood level or by floodproofing; and
4. Modifying structures to meet another need of a subapplicant, such as through an improved project or an alternate project under the Public Assistance Program.

Structures may also be upgraded to meet current codes unrelated to damage from natural hazards, such as upgrades required by changes in capacity or function and upgrades necessary to meet the requirements of the Americans with Disabilities Act.

Providing Temporary Facilities

FEMA may provide temporary housing facilities when a disaster renders homes uninhabitable for long periods. Such facilities typically consist of manufactured housing. Typical activities may involve:

1. Developing the pads for dwellings;

2. Constructing ancillary facilities, such as roads, streets, and parking lots;

3. Installing utilities, such as potable water lines, sewer hookups, electricity (including street lighting), and telephones lines; and

4. Installing manufactured homes.

FEMA may provide temporary facilities if other housing options, such as vacant hotel rooms or available rental units, are not feasible. Sites will not be located in a floodplain, wetlands, or critical habitat; affect historic properties or archaeological sites; or contain hazardous materials. Installation of housing units and utilities is to be accomplished in accordance with current codes and standards. After temporary housing is no longer needed at the disaster site, FEMA will remove the temporary housing units and associated ancillary facilities, and restore the land to its original use. All removed materials are stored for future use or disposed of in accordance with applicable laws and regulations.

Another method that FEMA will use to provide temporary housing involves modifying existing facilities to serve as temporary housing. These facilities could consist of existing residential property or the adaptive reuse of non-residential facilities. Specific activities range from conducting repairs and minor upgrades to complete reconstruction of a building's interior. This action may involve acquisition or leasing of facilities. Modifying existing facilities for temporary housing may be conducted by FEMA directly or by providing funding to a subapplicant.

FEMA may also provide funding for temporary relocation of essential public services, in the event that the structures that house these services are damaged, destroyed, or otherwise rendered inaccessible by a disaster. Funds may also be provided for upgrades necessary to meet current codes and standards and for the installation or modification of appurtenances, such as utilities, that are necessary to operate facilities.

Acquiring and Demolishing Existing Facilities

FEMA may provide funds for the acquisition and demolition of existing facilities, particularly if they are located in high-hazard areas and are subject to repetitive loss. Typically, these facilities are at a high risk because of: (1) damage from flooding; (2) erosion of stream banks, beaches, slopes, or bluffs; (3) landslides; or (4) wildfire. These facilities may consist of private properties, such as houses and commercial buildings, or publicly-owned facilities, such as utilities, roads, and bridges. A local government entity will purchase private properties on a willing-seller basis and, after the property is purchased, the property will be dedicated and maintained in perpetuity for uses compatible with open space, recreation, or wetlands management practices, pursuant to 44 CFR Part 206.434(d).

Existing facilities will be either removed or demolished. All demolition materials will be disposed of at approved and licensed disposal sites, in compliance with applicable laws and regulations. Any hazardous materials or other contaminants will be removed and disposed of in an appropriate manner. Construction debris and household materials may be recycled if recycling facilities exist. Once structures are removed, lots will be graded to conform to the local topography, and disturbed areas will be revegetated with species approved for the local area. Frequently, the local government will develop the acquired land for recreational or open space uses, such as parks, athletic fields, or walking and biking trails.

Repairing, Realigning, or Otherwise Modifying Roads, Trails, Utilities, and Rail Lines

Roads, trails, utilities[2], and rail lines are typically damaged when floods or heavy rains cause erosion, subsidence, or landslides. Earthquakes may cause similar damage. Repairs are accomplished by replacing earthen material lost during the disaster and replacing the damaged surface, utility line, or, in the case of rail lines, ballast, and track. Stabilizing the replacement fill using rock, grout, timber walls, or steel sheet piling may be necessary. Hazard mitigation measures may be performed to prevent or limit future damage. For example, a pipe may be installed to convey drainage beneath a road to prevent future washouts, or a utility line may be encased in concrete in an area vulnerable to erosion.

If the area of damage is unstable, does not allow for repair, or is subject to repetitive loss, a facility may be realigned so that the area of damage is avoided. Property acquisition or a change in easement may be necessary.

Facilities may also be modified as part of improved projects or alternate projects under the Public Assistance Program to meet additional needs of the subapplicant.

Constructing New Facilities or Relocating Existing Facilities

If a facility is located in a floodplain or other hazardous area[3], is subject to repetitive damage, or has been damaged in such a way that restoration in the current location is not practical or cost-effective, FEMA may fund the construction of a new facility or the physical relocation of the existing facility. Examples of this action include construction of roads, trails, utilities and utility lines, and rail lines in a different area from the existing facility; construction and relocation of buildings; construction of safe rooms; and construction of drainage improvements.

In both new facility construction and physical relocation, FEMA may fund the cost of land acquisition and the construction of appurtenant features, such as access roads and utilities. For properties in the hazard area, FEMA acquires damaged properties, demolishes existing structures (except in cases of physical relocation), and places deed restrictions that will limit future uses to open space in perpetuity. However, FEMA does not acquire land directly nor does it become a land-owning agency as a result of this process.

[2] Utilities refer to water, sewer, natural gas, and power/electrical systems and similar types of infrastructure.
[3] Hazard areas are susceptible to some type of natural hazard, such as flooding, seismic activity, coastal inundation, or mudslide.

Relocating the Function of an Existing Facility

FEMA may fund the relocation of a function of a facility to an existing facility that has adequate capacity to handle the additional load with minor modifications, if necessary. For structures, the occupants and materials will be relocated to alternative structures, traffic will use alternate routes, and utility services will be provided by alternative methods. This action will not entail any major physical construction or addition to the existing facility and, if any work is required, it will consist of only minor modifications. A typical example is transferring students from a damaged or flood-prone school to a suitable existing school nearby, if feasible in terms of capacity and convenience for students, families, and teachers. For properties in the hazard area, FEMA will acquire damaged properties, demolish existing structures, and place deed restrictions that will limit future uses to open space in perpetuity.

Developing Demonstration Projects

Demonstration projects focus on public education and are designed to highlight procedures that the public can use to reduce property damage during flood, earthquake, wildfire, wind, and rainstorm disasters. Demonstration projects may involve the development of a model facility to demonstrate how hazard mitigation technologies can be used to reduce potential damage during a disaster. Flood demonstration projects may involve items such as elevating a structure or waterproofing windows and doors that are below the base flood elevation. A fire demonstration project may include vegetation management around a facility and replacing roofs, doors, and windows with fire-resistant materials. Wind and earthquake demonstration projects may include changes to the structural design of buildings to allow them to withstand higher wind velocity or more movement during an earthquake.

Actions Involving Watercourses and Coastal Features

Many FEMA activities pertain to inland water sources, such as streams, rivers, and lakes, and coastal features, such as harbors and beaches. Inland water sources may be perennial or dry during the summer months. During construction, avoidance and minimization measures are typically used and incorporated as part of the action. Work in a stream channel often includes temporary diversion of the channel using sandbags or a cofferdam constructed of fill. Heavy equipment is typically operated from an adjacent road, bank, or other feature; however, in some cases, operating equipment in a channel area once flow has been diverted may be necessary. A pipe or a temporary secondary channel may be used to convey the diverted water.

If the action involves channel modifications, changes to the capacity of bridges and culverts, or the installation of attenuation structures, then it may be necessary to conduct hydraulic/hydrologic analyses.

Relevant categories of activities include the following:

1. Repairing, stabilizing, or armoring embankments;
2. Creating, widening, clearing, or dredging a waterway;
3. Constructing or modifying a water crossing;
4. Constructing or modifying a water detention, retention, storage, or conveyance facility;
5. Constructing or modifying other flood control structures; and
6. Constructing or modifying a coastal feature.

Repairing, Stabilizing, or Armoring Embankments

Repairing, stabilizing, or armoring embankments will involve the repair of earthen or rock embankments damaged by floodwaters. Examples are natural stream banks (such as those in parks); road, trail, and rail line embankments; embankments for irrigation and navigation canals; and levees used for flood control and reclamation. In addition to repair of damaged features, FEMA may fund measures designed to prevent damage in future flood events.

In addition to replacing fill material, embankments may be stabilized or armored through:

1. Placing of rock riprap;
2. Hardening with concrete or soil cement;
3. Installing retaining walls, gabions, or geotextile fabrics; and/or
4. Using bioengineering techniques, such as planting vegetation, placing root wads, or placing willow bundles.

A combination of these techniques may be employed. For example, rock and geotextiles, when used with root wads and willow bundles, may provide mitigation from erosion while enhancing the natural values of a stream corridor.

Creating, Widening, Clearing, or Dredging a Waterway

Creating, widening, clearing, or dredging a waterway may be used to reduce the flood hazard to adjacent lands, facilities, or populated areas. New channels may be constructed to convey excess flows around flood-prone areas during flood events. Drainage swales, earthen channels, concrete channels, or subsurface concrete pipes can also be used as a means of conveyance. A new channel may be constructed in a dry environment and connected to a stream after completion. This channel may have an inlet weir higher than the elevation of the normal flow so that the normal flows remain in the natural channel. The outlet may be armored with concrete or rock riprap to prevent excessive erosion of the existing channel.

Existing channels may be widened to allow a channel to convey a larger volume of water. Conveyance may also be increased by replacing earthen banks or channel bottoms with concrete. To the extent possible, construction will be conducted from the top of the bank, but many activities may require construction equipment to work in the stream channel. In perennially flowing streams, work in a stream channel will generally be restricted to the low-flow period, and the flow will be diverted around the construction area. A pipe or a temporary secondary channel will be used to convey the diverted water.

As an alternative to constructing a bypass or modifying an existing channel, the existing channel may be cleared of vegetation or sediment to increase conveyance. This action will often be used in developed areas where modifications are not feasible, as well as in areas where years of inadequate maintenance have allowed trees and brush to grow within the channel or sediment and debris to accumulate in the channel or around culverts and bridges. Vegetation may be removed through mechanical means, by hand, or by application of herbicides. Vegetation may be removed not only from the channel but also from the banks and high-water areas, reducing the risk that floating debris will be trapped by trees or heavy brush. Sediment and debris may be removed by dredging, through use of heavy equipment, or by hand. All removed debris will be disposed of at approved and licensed disposal sites, in compliance with applicable laws and regulations. Woody debris and vegetation can be recycled if recycling facilities exist.

Constructing a Water Crossing

FEMA may fund the repair or replacement of damaged water crossings, the enlargement of openings to allow greater conveyance and reduce the risk that debris will get trapped during floods, or the installation of bank protection or other means to reduce the risk of erosion. Crossings may also be relocated or improved to avoid high-hazard areas, repetitive damage, or areas where reconstruction is not cost-effective or feasible.

Culverts may consist of corrugated metal pipes, reinforced concrete pipes, or reinforced concrete box culverts. The capacity of a culvert crossing may be increased to reduce the risk of flooding to the surrounding area, or the culvert may be modified to prevent overtopping or erosion of the crossing. Typical measures will include:

1. Increasing the size of a culvert or adding culvert barrels;

2. Changing the type of culvert;

3. Changing the location or alignment of a culvert; and

4. Adding features, such as a headwall, discharge apron, or riprap to reduce the risk of erosion or damage to a culvert or the crossing.

Similarly, 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 will include:

1. Widening existing openings or constructing new openings;

2. Reconfiguring bracing to reduce the risk that debris will be trapped;

3. Installing protective features, such as concrete abutments or riprap, to reduce the risk of damage due to erosion and scour; and

4. Replacing a multi-span structure with a clear-span structure.

A bridge may be installed to replace a culvert to increase the flow capacity of a crossing. Low-water crossings may be installed or improved as an alternative to repairing or replacing a culvert or bridge. Constructing or upgrading a low-water crossing will typically involve hardening the banks and bottom of a water body. A temporary diversion may be necessary during construction activities.

Constructing a Water Detention, Retention, Storage, or Conveyance Facility

Constructing a water detention, retention, storage, or conveyance facility may include the construction, enlargement, or restoration of detention basins, retention basins, sediment ponds, reservoirs, or conveyance facilities, such as irrigation ditches or flumes, to reduce flood flows or to provide a water source for fighting fires in an area of high fire hazard. The creation and/or enlargement of water storage reservoirs will be most frequently associated with flood disasters and to a lesser extent, fire disasters.

Detention basins, retention basins, sediment ponds, and reservoirs will be constructed to temporarily store floodwater to reduce downstream peak flows. The stored water will be released at a slower rate so that the existing drainages can convey water without contributing to downstream flooding. All areas that will be disturbed during the construction of these features will be revegetated with native plant species. This action will also include the repair or restoration of water retention or conveyance structures. All sediment removed from these features will be disposed of in a manner consistent with Federal, State, and local laws and regulations.

Frequently in rural areas, firefighting is heavily constrained by the lack of water that firefighters can use. In response to this need, proposed activities may also include the creation of retention facilities in locations that firefighters can readily access, either as a direct source of water or as a source of water to fill water supply trucks. All areas that will be disturbed during the construction of a retention facility will be revegetated with native plant species.

Constructing Other Flood-Control Structures

A flood-control structure is a facility designed to prevent floodwaters from entering a flood-prone area. Typical examples are levees (also referred to as dikes) and floodwalls. Activities will include:

1. Repairing damaged facilities, usually during emergency situations;
2. Installing embankment protection;
3. Raising the height of existing facilities to prevent overtopping in future floods;
4. Constructing new facilities to protect flood-prone areas from damage during future floods; and
5. Modifying or installing interior drainage systems to reduce the risk of damage behind levees and floodwalls during heavy rains or flooding events on tributary streams.

Levees will be repaired or constructed using compacted fill and, in some cases, riprap protection. Bare earth will be seeded with grasses to prevent erosion. Typically, a gravel road will be installed on the levee's crest to allow for maintenance. Floodwalls, typically built in urban areas, will be constructed using reinforced concrete or grouted, reinforced concrete block. Excavation will be necessary to install footings. Levees and floodwalls will both have interior drainage systems that may include pumps for removing accumulated water.

Constructing a Coastal Feature

Constructing a coastal feature will involve the repair, replacement, or construction of facilities in coastal environments, such as estuaries, inlets, harbors, and beaches. These facilities include:

1. Recreational facilities, such as piers and boat ramps;
2. Facilities for maritime use, such as docks and slips;
3. Shoreline protection devices, such as seawalls, groins, jetties, and revetments; and
4. Coastal flood control structures, such as levees.

Construction activities will be expected to occur in water and involve driving piles, placing rock or soil, or dredging sand, mud, or other 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. Vegetation management for wildfire risk reduction may be accomplished using mechanical means, hand-clearing, application of herbicides, or grazing. Some activities may include a combination of these methods.

Relevant categories of activities are:

1. Mechanical or hand clearing of vegetation;

2. Herbicidal treatments; and

3. Biological control.

In biological control, cattle, horses, goats, sheep, or other livestock will be allowed to graze on grasses and other vegetation as a means of control. The 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). However, biological control will not occur in occupied or designated critical habitat for federally listed species.

Mechanical or Hand Clearing of Vegetation

Mechanical or hand clearing of vegetation will be used for the selective removal of vegetation so that a certain proportion of vegetation is left in place. This will be done to reduce the amount of vegetative fuels in an area where mechanical removal of vegetation is impractical or the remaining vegetation needs to be protected. Vegetation may be removed to create defensible space around buildings and structures and to protect life and property beyond defensible space perimeters but proximate to (less than 2 miles from) at-risk structures. The creation and maintenance of firebreaks, access roads, and staging areas is not eligible for FEMA funding.

In mechanical removal, heavy equipment will be used to uproot, crush, pulverize, or cut the trees and brush being removed. Hand removal will involve the use of chainsaws, axes, and hoes to cut and uproot vegetation. Depending on the location of the vegetation removal project and State and local regulations, vegetation downed as a result of mechanical or hand removal will be piled and burned on site, chipped and spread on site, or loaded and hauled away from the site. After the removal of the targeted vegetation, cleared areas may be revegetated with native, fire-resistant species. Vegetation hauled off-site can be recycled, but it must be disposed of in accordance with appropriate requirements.

Herbicidal Treatments

Activities generally associated with herbicidal treatment will include the removal of targeted nonnative species within specific areas and the prevention of growth and re-sprouting of undesirable vegetation once an area has been cleared of excessive vegetation by mechanical removal and/or hand removal. Only U.S. Environmental Protection Agency-approved herbicides will be used to control the growth of undesired vegetation in a manner consistent with labeling instructions and applicable Federal and State regulations. After treatment, some areas may be revegetated with native vegetation that is fire resistant.

Conservation 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 on site in an appropriate, safe, approved area or off site 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 federally listed 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 20 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 on site, if applicable. The plan will incorporate hazardous waste, stormwater, and other emergency planning requirements.

GEN AMM-5 Spill Prevention and Pollution Control Measures

The subapplicant will exercise every reasonable precaution to protect federally listed 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 federally listed 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 federally listed 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 federally listed species. A plan for the emergency cleanup of any hazardous material will be available on site, and adequate materials for spill cleanup will be maintained on-site.

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 off site. 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 disposed of properly. 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 federally listed species or their habitats. Spills, leaks, and other problems of a similar nature will be resolved immediately to prevent unnecessary effects on federally listed species and their habitats. A plan for the emergency cleanup of any spills of fuel or other material will be available on site, and adequate materials for spill cleanup will be maintained onsite.

GEN AMM-7 Fueling Activities

Avoidance and minimization measures will be applied to protect federally listed 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 federally listed 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 State. 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 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. Also, fire extinguishers will be required for all vehicles used within or adjacent to undeveloped open spaces.

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 federally listed 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, 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 federally listed species that may occur on site, 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 3 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-16 Biological Monitor

If a project involves activities that may result in any potential take, as defined by the Act, of a federally listed species, a CFWO-approved biological monitor will be present on site for all construction activities that occur within 100 feet of habitats for those species. If a biological monitor is needed, the subapplicant will submit the biological monitor's qualifications to the CFWO for approval 30 days prior to project construction. The biological monitor will ensure that all applicable avoidance and minimization measures are implemented during project construction. The biological monitor 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 biological monitor 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 biological monitor will oversee construction activities to ensure that the project does not result in adverse effects to federally listed species beyond those anticipated/authorized in this biological opinion. The biological monitor will have the authority to stop any work activities that could result in potential adverse effects to federally listed species and/or their habitats.

Approval requests from the subapplicants for Service-approved biologists will include, at minimum:

a. Relevant education;

b. Relevant training concerning the listed species for which approval is requested, including species identification, survey techniques, handling individuals of different age classes, and handling of different life stages by a permitted biologist or recognized species expert authorized by the Service for such activities;

c. A summary of field experience conducting requested activities (to include project/research information);

d. A summary of biological opinions under which they were authorized to work with the requested species and at what level (such as construction monitoring versus handling), this will also include the names and qualification of persons under which the work was supervised as well as the amount of work experience on the actual project;

e. A list of federal recovery permits [10(a)1(A)] held or under which they are authorized to work with the species requested (to include the permit number, authorized activities and name of permit holder); and

f. Any relevant professional references with contact information.

GEN AMM-17 Daily Work Hours

Construction activities that could affect suitable habitat for federally listed 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 Service-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 programmatic biological opinion.

GEN AMM-19 Water Quality Protection

Contractors will exercise every reasonable precaution to protect federally listed 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 Act-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.

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 construction 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 construction 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 nonnative aquatic plant and animal species (CDFW 2008).

Construction equipment will be clean of debris or material that may harbor seeds or nonnative 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 potential impacts to sucker. 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:

- Heavy equipment will avoid flowing water other than temporary crossing or diverting activities.
- Water pumped or removed from dewatered areas will be treated before its release so that it does not contribute to turbidity in nearby waters.
- Temporary culverts to convey live flow during construction activities will be of an adequate size as to not increase stream velocity and placed at stream grade.
- 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 Fish Relocation

> Fish relocation will only be conducted by a CFWO-approved fisheries biologist. If a fisheries biologist is needed, the subapplicant will submit the fisheries biologist's qualifications and a detailed description of the specific relocation methodology to the CFWO for approval 30 days prior to project construction. The fisheries biologist will have knowledge and experience in listed fish species biology and ecology, fish/habitat relationships, biological monitoring, and handling, collecting, and relocating listed fish species or other relevant experience. The biologist will relocate any stranded fish to an appropriate place depending on the life stage of the fish and flow conditions in the vicinity. The fish will be relocated to the nearest suitable habitat within the potentially affected watershed and occupied habitat. The biologist will note the number of individuals observed in the affected area, the number of individuals relocated, the approximate size of individuals, and the date and time of the collection and relocation. One or more of the following methods will be used to capture listed fish: electrofishing, dip net, seine, throw net, minnow trap, and hand.

Species-Specific Conservation Measures

Quino

QUINO 1 Habitat Assessment: A habitat assessment will be conducted by a biologist no more than 30 days prior to the onset of ground disturbance to determine whether suitable habitat for the Quino occurs in the action area, in accordance with the Service survey guidelines. The Service guidelines for this species provide a map displaying the areas in southern California where habitat assessments are recommended. During the survey, any locations of Quino or host plants will be clearly marked. Host plants include, but are not limited to, dwarf plantain (*Plantago erecta*), purple owl's clover/Indian paintbrush (*Castilleja exserta* spp. *exerta*), Patagonian plantain (*Plantago patagonica*), white snapdragon (*Anterrhinum coulterianum*), Chinese houses (*Collinsia concolor*), and thread-leaved bird's beak (*Cordylanthus rigidus*). 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 Quino, the CFWO will be contacted regarding the need for surveys according to Service protocol, and those surveys will be conducted, as appropriate. With CFWO concurrence, FEMA may also forgo surveys by making a determination that suitable habitat is occupied for the purposes of section 7 consultation.

QUINO 2 Fencing/Flagging: Any host plants within Quino occupied or designated critical habitat (Quino habitat) and within 150 feet of the project footprint will be clearly marked and avoided to the maximum extent practicable. Fencing/flagging will be placed along the edge of the work area near any host plants to prevent workers and vehicles from entering this area. Fencing/flagging will be installed prior to any ground-disturbing or vegetation removal activities. A CFWO-approved biologist will supervise the installation of flagging or fencing around host plants. The fencing/flagging will be placed the maximum distance from the plants that is feasible, while still allowing work to occur in the adjacent area. No construction activities will occur in the fenced/flagged area.

QUINO 3 Biological Monitor: Each day that work occurs within 150 feet of Quino habitat, the CFWO-approved biologist will monitor for Quino, inspect the fencing/flagging, and immediately address any necessary fencing/flagging repairs. If the CFWO-approved biologist recommends that work be stopped because Quino or their host plants will be affected to a degree that exceeds the levels anticipated (i.e., impacts to areas flagged for avoidance or project impacts exceeding 2 acres), 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.

QUINO 4 Seasonal Avoidance: If complete avoidance of Quino or its habitat is not possible, then construction will be avoided during the host plant growing season, adult flight season, and larval feeding season (March 1-June 30).

QUINO 5 Dust Control: Dust will be controlled during construction by periodically watering down construction areas within 100 feet of Quino occupied habitat, as necessary.

QUINO 6 Habitat Avoidance and Disturbance Limits: No permanent impacts to Quino habitat will occur under the proposed project and permanent or temporary impacts to core occurrence complexes (Service 2009a, 2003) will be avoided unless the impacts to habitat are determined to be insignificant via project-level consultation with the CFWO (i.e., small impacts that will have a negligible effect on habitat quality for Quino). Temporary impacts will not result in more than 2 acres of ground disturbance of Quino habitat for a given project. In addition, not more than 50 acres of Quino habitat will be impacted in total.

QUINO 7 Restoration of Disturbed Areas: Restoration of temporary impacts to Quino habitat will occur in accordance with a restoration plan that is reviewed and approved by the CFWO prior to implementation of the proposed project. All temporary impacts will be restored with an assemblage of native species consistent the habitat affected and include host plants found in the vicinity of the action area.

QUINO 8 Invasive Non-Native Plant Species Prevention: The spread of nonnative weeds during construction activities and revegetation efforts will be controlled. All vehicles will be cleaned and free of mud and debris prior to entering the action area, and all erosion and other sedimentation controls used during and after construction will be certified weed free, as applicable. Weed free hay, straw bales, or mulch maybe available through the California Interagency Noxious Weed Free Forage and Mulch Program.

QUINO 9 Site Restrictions: Access routes, staging areas, and total project footprint within Quino habitat will be limited to the minimum necessary to achieve the project goal.

Arroyo Toad

ARTO 1 Habitat Assessment: A habitat assessment will be conducted by a CFWO-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 CFWO will be contacted regarding the need for surveys according to Service protocol, and those surveys will be conducted, as appropriate. With CFWO 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 CFWO-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 and occupied habitat will occur outside the breeding season (i.e., the breeding season is March 15 - July 15 for arroyo toad) to the maximum extent practicable. If the breeding season cannot be avoided, a CFWO-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. If the breeding season cannot be avoided and arroyo toads are found to occur within the action area, a CFWO-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.

ARTO 4 Pre-construction Survey: If a project is located in designated critical habitat or occupied habitat for the arroyo toad, a CFWO-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 project location 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: Project activities in arroyo toad occupied habitat will be monitored using a CFWO-approved biological monitor with the authority to stop work. The biological monitor will search the action area daily for arroyo toads.

ARTO 7 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 CFWO (i.e., small permanent impacts that will have a negligible effect on habitat quality for arroyo toad). Temporary impacts to arroyo toad habitat will be restricted to 1 acre per project and 10 acres overall.

Least Bell's Vireo

LBV 1 LBV-1 Habitat Assessment: A habitat assessment will be conducted by a biologist to determine whether suitable habitat (including foraging, nesting, and dispersal) for the vireo 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 vireo, the CFWO will be contacted regarding the need for surveys according to Service protocol, and those surveys will be conducted, as appropriate. With CFWO concurrence, FEMA may also forgo surveys by making a determination that suitable habitat is occupied for the purposes of section 7 consultation

LBV 2 LBV-2 Seasonal Avoidance: To minimize effects to nesting vireos, all clearing of vegetation within occupied habitat will occur outside the breeding season (i.e., March 15-September 15) to the maximum extent practicable. If the breeding season cannot be avoided, a CFWO-approved biologist will conduct preconstruction nesting bird surveys, at least 48 hours before and no more than 1 week prior to vegetation removal. If no active nests are found to occur within 300 feet of the project area, project activities may proceed.

LBV 3 LBV-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 CFWO-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. A biologist will monitor the nest during construction for signs of adverse effects including distress/disturbance. If adverse effects are detected then the

CFWO-approved biologist will have the authority to stop all construction in the vicinity of the nest and will coordinate with the Service to determine whether additional conservation measures will avoid or minimize effects on the nesting birds. Construction may resume only with approval from the Service. AND

c. The biologist will continue to monitor the nest and 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.

LBV 4 Habitat Avoidance: Staging and temporary construction areas will be located outside of suitable habitat and will use existing roads and developed areas to the extent possible. All mature riparian vegetation (e.g., willows and cottonwoods) greater than 30 feet in height will be avoided to the maximum extent possible. If mature riparian vegetation cannot be avoided, it will be either transplanted elsewhere within or near the action area or placed horizontally or diagonally outside the project footprint under the direction of a CFWO-approved biologist.

LBV 5 LBV-5 Habitat 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 CFWO.

LBV 6 LBV-6 Limits on Habitat Disturbance: For any specific project, temporary impacts on occupied or designated critical habitat by the vireo will be limited to a maximum of 1 acre. Temporary impacts from all the projects will also be limited to a maximum of 20 acres of vireo occupied or designated critical habitat. In addition, impacts will be limited to 10 vireo territories[4].

LBV 7 LBV-7 No Permanent Loss of Habitat: No permanent loss of occupied or designated critical habitat for the least Bell's will occur unless the impacts to habitat are determined to be insignificant via project-level consultation (i.e., small permanent impacts that will have a negligible effect on habitat quality for least Bell's vireo).

Coastal California Gnatcatcher

CAGN 1 Habitat Assessment: A habitat assessment will be conducted by a 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 CFWO will be contacted

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[4] Whether the level of impact to habitat in a given territory results in adverse effects will be determined on a case-by-case basis as specific projects are identified and submitted for project-level consultation.

regarding the need for surveys according to the Service protocol and those surveys will be conducted, as appropriate. With CFWO concurrence, FEMA may also forgo surveys by making a determination that suitable habitat is occupied for the purposes of section 7 consultation.

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 CFWO-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 CFWO-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 CFWO-approved biologist will monitor the nest during construction for signs of adverse effects including distress/disturbance. If adverse effects are detected, then the CFWO-approved biologist will have the authority to stop all construction activating in the vicinity of the nest and coordinate with the CFWO to determine whether additional conservation measures are can avoid or minimize effects on the nesting birds. Construction may resume only with approval from the CFWO. 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 restoration plan that is reviewed and approved by the CFWO prior to the proposed project.

CAGN 6 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[5].

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

Santa Ana Sucker

SASU 1 Biological Monitor and Seasonal Avoidance: Project activities in or adjacent to[6] sucker occupied habitat will be monitored using a CFWO-approved biologist with the authority to stop work and will occur outside the spawning season (i.e., March through July).

SASU 2 Limits on Habitat Disturbance: Project activities will not adversely affect sucker occupied habitat in the Santa Ana River or result in permanent loss of sucker habitat in any occupied waterway unless the impacts to habitat are determined to be insignificant via project-level consultation (i.e., small permanent impacts that will have a negligible effect on habitat quality for sucker). Temporary impacts will be restricted to a total of 0.5 mile of occupied habitat covered under this programmatic consultation, but not more than 0.1 mile of occupied habitat for a given project.

SASU 3 SASU-3 Fish Passage: If a project includes the creation of an overflow or flood-bypass channel in a river or stream potentially supporting sucker, the design and construction of such a channel must allow fish passage out of the channel before waters dry up as the floodwater recedes.

SASU 4 SASU-4 Dewatering Activities: In-channel work and channel diversion of live flow during project construction within occupied habitat for the sucker will be conducted in a manner to reduce potential impacts to rearing and migrating sucker. Dewatering will be used to create a dry work area and will be conducted in a

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[5] Whether the level of impact to habitat in a given territory results in adverse effects will be determined on a case-by-case basis as specific projects are identified and submitted for project-level consultation.
[6] The specific definition of "adjacent to" will be determined on a case-by-case basis.

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 sucker may be present in the areas to be dewatered, a Service-approved fish rescue will be conducted by a Service-approved fisheries biologist in accordance with measures 75 and 76 below.

c. Water pumped or removed from dewatered areas will be treated before its release so that it does not contribute turbidity to nearby waters.

d. Pump intakes will be provisioned with National Marine Fisheries Service-approved fish screening as outlined in the California Department of Fish and Wildlife Fish Screening Criteria and National Marine Fisheries Service Fish Screening Criteria for Anadromous Salmonids (NMFS 1997).

e. Temporary culverts to convey live flow during construction activities will be of an adequate size as to not increase stream velocity and placed at stream grade.

f. 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.

SASU 5 Fish Capture and Relocation Plan: For projects that require fish rescue and relocation, a fish relocation plan will be developed and submitted to the CFWO for approval. This plan will incorporate the latest Service guidance relating to the capture and relocation of fish.

SASU 6 Service-Approved Biologist for Fish Relocation: Fish relocation will only be conducted by a Service-approved fisheries biologist. If a fisheries biologist is needed, the subapplicant will submit the fisheries biologist’s qualifications to the CFWO for approval 30 days prior to project construction. The fisheries biologist will have knowledge and experience in sucker biology and ecology, fish/habitat relationships, and biological monitoring, and handling, collecting, and relocating sucker or other relevant experience. The biologist will relocate any stranded fish to an appropriate place depending upon the life stage of the fish and flow conditions in the vicinity. The biologist will note the number of individuals observed in the affected area, the number of individuals relocated, the approximate size of individuals, and the date and time of the collection and relocation. One or more of the following methods will be used to capture sucker: electrofishing, dip net, seine, throw net, minnow trap, and hand.

Action Area

According to 50 CFR § 402.02 pursuant to section 7 of the Act, the “action area” means all areas to be affected directly or indirectly by the Federal action. Subsequent analyses of the environmental baseline, effects of the action, and levels of incidental take are based upon the action area. The action area for this consultation encompasses the jurisdiction of the CFWO.

STATUS OF THE SPECIES/CRITICAL HABITAT

Quino Checkerspot Butterfly

The Service federally listed Quino as endangered on January 16, 1997 (Service 1997), and issued a recovery plan on August 11, 2003 (Service 2003). This species is known from western Riverside County and San Diego County. The number of known populations has increased since listing. Based on our current methodology for identifying populations, five populations were known at listing, and more than 20 populations are known post-listing (Service 2009a).

The Quino is a subspecies of the Edith’s checkerspot butterfly (*Euphydryas editha*). It differs from other subspecies by size, wing coloration, and larval and pupal phenotype. The Quino life cycle includes four distinct life stages: egg, larva (caterpillar), pupa (chrysalis), and adult. There is usually one generation of adults per year, although larvae may remain in diapause for multiple years prior to maturation. Quino require an external heat source to increase their metabolic rate to levels needed for normal growth and behavior. Larvae seek microclimates with high solar exposure for basking in order to speed their growth rate. Also, like most butterflies, adults frequently bask and remain in sunny areas to increase their body temperature to the level required for normal active behavior (Service 2009a). In addition, larval host plants for Quino are often associated with cryptogamic crusts (a thin organic crust composed of cyanobacteria, lichens, mosses, and fungi). Cryptogamic crusts also inhibit growth of nonnative plants (Service 2003). Cryptogamic crusts have become rare due to past and ongoing ground disturbance, such as grazing (Service 2003).

The status of Quino was described in detail in the 5-year review for this species (Service 2009a). Please refer to this document and the recovery plan for detailed information on life history requirements, threats, and conservation needs of this species The 5-year review of Quino checkerspot butterfly recommends working with partners near the community of Anza to protect habitat; research on herbicides, the Campo core population, and secondary host plants; conducting an experimental reestablishment at Irvine Ranch Preserve; conducting surveys at California Department of Fish and Wildlife preserve lands near Ramona; monitoring core populations, and considering updating the recovery plan.

Subsequent to completion of the 5-year review in 2009, the Service issued a non-jeopardy and no adverse modification biological and conference opinion addressing construction and long-term operations and maintenance of the Sunrise Powerlink (SRPL) Project (Service 2010a). The SRPL Project included construction of a high-voltage 117-mile transmission line and related facilities from south of El Centro in Imperial County to the northeast edge of Marine Corps Air Station Miramar in San Diego County. The biological and conference opinion addressed the impacts (i.e., loss and/or temporary disturbance) to 6 acres of Quino occupied habitat due to construction and an additional 23 acres due to maintenance and vegetation management activities. Impacts to the Quino as a result of the SRPL Project were fully offset through acquisition and provision of long-term management of Quino occupied habitat at the Long Potrero site in San Diego County, just south of the Descanso Ranger District of the Cleveland National Forest. This site was estimated to have 812 acres of Quino occupied habitat (Service 2010a).

Critical Habitat

On July 17, 2009, the Service designated approximately 62,125 acres of critical habitat for the Quino (Service 2009b). This critical habitat occurs in 9 units including the Skinner/Johnson Unit (5,444 acres), Sage Unit (123 acres), Wilson Valley Unit (463 acres), Vail Lake/Oak Mountain Unit (1,788 acres), Tule Peak Unit (326 acres), Bautista Unit (13,880 acres), Otay Unit (34,941 acres), La Posta/Campo Unit (355 acres) and Jacumba Unit (2,514 acres). The physical and biological features (PBFs[7]) of designated critical habitat for Quino are:

1. Open areas within scrublands at least 21.5 square feet in size that:

   a. contain no woody canopy cover; and

   b. contain one or more of the host plants *Plantago erecta*, *Plantago patagonica*, *Antirrhinum coulterianum*, or *Collinsia concolor* used for Quino growth, reproduction, and feeding; or

   c. contain one or more of the host plants *Cordylanthus rigidus* or *Castilleja exserta* that are within 328 feet of the host plants listed in b) above; or

   d. contain flowering plants with a corolla tube less than or equal to 0.43 inch used for Quino feeding;

2. Open scrubland areas and vegetation within 656 feet of the open canopy areas used for movement and basking; and

3. Hilltops or ridges within scrublands that contain an open, woody-canopy area at least 21.5 square feet in size used for Quino mating (hilltopping behavior) and are contiguous with (but not otherwise included in) open areas and natural vegetation described in PBFs 1 and 2 above.

[7] The designation(s) of critical habitat for (species) use(s) the term primary constituent element or essential features. The new critical habitat regulations (81 FR 7214) replace this term with PBFs. This shift in terminology does not change the approach used in conducting our analysis, whether the original designation identified primary constituent elements, PBFs, or essential features. In this consultation, we use the term PBFs to mean primary constituent elements or essential features, as appropriate for the specific critical habitat.

Arroyo Toad

The Service federally listed arroyo toad as endangered on December 16, 1994 (Service 1994a), and on July 24, 1999, issued the Arroyo southwestern toad (*Bufo microscaphus californicus*) recovery plan (arroyo toad recovery plan) (Service 1999). The arroyo toad recovery plan identifies recovery units and number of populations for each unit to allow for delisting. The arroyo toad is a small, light-olive green or gray to tan toad with dark spots and warty skin. Arroyo toads are terrestrial for much of the year and can range widely into upland habitat for foraging and burrowing, but they use aquatic habitat for breeding. Breeding occurs in shallow, slow-moving stream systems and may occur from January to July. Breeding tends to occur earlier in coastal areas than inland areas (Service 1999). Thirty-five populations of arroyo toad are distributed from Monterey County, California in the United States south to Baja California, Mexico (Service 2015). Urbanization, agriculture, and dams are the main reasons for the decline of arroyo toad and are also current threats. Other threats include water management activities and diversions; road construction, maintenance, and use; grazing; mining; recreation; and nonnative plants and animals (Service 1999).

More detailed information on the status of arroyo toad can be found in the arroyo toad recovery plan, 5-year review (http://ecos.fws.gov/docs/five_year_review/doc2592.pdf) (Service 2009) and the latest rule regarding this species (Service 2015). Please refer to these documents for detailed information on life history requirements, threats, and conservation needs of the species rangewide.

Critical Habitat

On February 9, 2011, the Service designated approximately 98,366 acres of critical habitat for the arroyo toad (Service 2011a). This critical habitat occurs in 21 units within Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego counties, California. The PBFs of designated critical habitat for the arroyo toad 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 arroyo toads. Breeding pools must persist a minimum of 2 months for the completion of larval development. However, due to the dynamic nature of southern California riparian systems and flood regimes, the location of suitable breeding pools may vary from year to year. Specifically, the conditions necessary to allow for successful reproduction of arroyo toads are: (a) breeding pools that are less than 6 inches deep; (b) areas of flowing water with current velocities less than 1.3 feet per second; and (c) surface water that lasts for a minimum of 2 months during the breeding season (a sufficient wet period in the spring months to allow arroyo toad larvae to hatch, mature, and metamorphose).

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 arroyo 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: (a) is characterized by intermittent or near-perennial flow that contributes to the persistence of shallow pools into at least mid-summer; (b) maintains areas of open, sparsely vegetated, sandy stream channels and terraces by periodically scouring riparian vegetation; and (c) 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 upland habitats that allow for movement to breeding pools, foraging areas, overwintering sites, upstream and downstream dispersal, and connectivity to areas that contain suitable habitat.

Least Bell's Vireo

With an estimated 2,968 vireo territories as of 2006, the number of vireo territories has increased 10-fold since listing in 1986, when only 291 territories were known. Existing territories occur in San Diego, Riverside, Orange, San Bernardino, Los Angeles, Ventura, Santa Barbara, Inyo, Kern, Monterey, San Benito, and Stanislaus counties. An estimated 898 territories occur in Riverside County, while an estimated 87 territories occur in San Bernardino County (Service 2006). The status of vireo was described in detail in the 5-year review for Least Bell's Vireo (Service 2006). The 5-year review recommended downlisting of the species to threatened status based on a reduction of threats and growth of the population 10-fold since listing. Please refer to this document for information on the status of vireo rangewide and for detailed information on the life history requirements, threats, and conservation needs of the species. A draft recovery plan for vireo was issued in 1998 (Service 1998).

However, 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 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. 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.

Critical Habitat

Critical habitat for the vireo was designated on March 4, 1994 (Service 1994b), encompasses a total of about 36,000 acres in 10 localities in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego counties. The PBFs of designated critical habitat include riverine and floodplain habitats (particularly willow-dominated riparian woodland with dense understory vegetation maintained, in part, in a non-climax stage by periodic floods or other agents) and adjacent coastal sage scrub, chaparral, or other upland plant communities (Service 1994b).

Santa Ana Sucker

The sucker was listed as a threatened species in 2000 (Service 2000). The federally listed sucker is restricted to three non-contiguous populations: in lower Big Tujunga Canyon watershed (Los Angeles River drainage); the East, West, and North forks of San Gabriel River; and the lower and middle sections of the Santa Ana River watershed. A small population also occurs in San Dimas Canyon, a tributary to San Gabriel River. Populations in Santa Clara River watershed, including Piru and Sespe creeks (Swift *et al*. 1993), are not considered to be the listed entity. The status of sucker was described in detail in:

1. The 5-year review (Service 2011b),
2. The recovery outline (Service 2012) and;
3. The Santa Ana sucker recovery plan (Service 2017) Please refer to these documents for information on the status of sucker rangewide and for detailed information on life history requirements, threats, and conservation needs of the species.

Critical Habitat

Critical habitat for the sucker was designated on December 14, 2010 (Service 2010b). Sucker designated critical habitat occurs in the Santa Ana River Unit (Unit 1 (7,097 acres)), San Gabriel River Unit (Unit 2 (1,000 acres)), and Big Tujunga Creek Unit (Unit 3 (1,233 acres) (Service 2010b). The PBFs of designated critical habitat for the sucker include:

1. A functioning hydrological system within the historical geographic range of sucker that experiences peaks and ebbs in the water volume (either naturally or regulated) that encompasses areas that provide or contain sources of water and coarse sediment necessary to maintain all life stages of the species, including adults, juveniles, larvae, and eggs, in the riverine environment;

2. Stream channel substrate consisting of a mosaic of loose sand, gravel, cobble, and boulder substrates in a series of riffles, runs, pools, and shallow sandy stream margins necessary to maintain various life stages of the species, including adults, juveniles, larvae, and eggs, in the riverine environment;

3. Water depths greater than 1.2 inches and bottom water velocities greater than 0.01 feet per second;

4. Clear or only occasionally turbid water;

5. Water temperatures less than 86 °F;

6. Instream habitat that includes food sources (such as zooplankton, phytoplankton, and aquatic invertebrates), and associated vegetation such as aquatic emergent vegetation and adjacent riparian vegetation to provide: (a) Shading to reduce water temperature when ambient temperatures are high, (b) shelter during periods of high water velocity, and (c) protective cover from predators; and

7. Areas within perennial stream courses that may be periodically dewatered, but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted.

Coastal California Gnatcatcher

The Service listed the gnatcatcher as threatened on March 30, 1993 (Service 1993) and published a revised final rule designating critical habitat on December 19, 2007 (Service 2007). It has no recovery plan. The range of the gnatcatcher is coastal southern California and northwestern Baja California, Mexico. More specifically, this species ranges from southern Ventura and San Bernardino counties, California, south to near El Rosario, Mexico, at about 30 degrees north latitude (Service 2010c). The northern and eastern limits of the coastal scrub communities used by the gnatcatcher are largely bound by mountainous areas, while the southern limit is defined by the transition to the Vizcaíno desert.

Gnatcatchers were considered locally common in the mid-1940s, but they had declined substantially in the United States by the 1960s (Atwood 1980). At the time of listing in 1993, we estimated about 2,562 pairs of gnatcatchers remained in the United States (Service 1993), though this estimate was not statistically valid because it was calculated using methods not supported by probability theory (Winchell & Doherty 2008). Additionally, population sizes are known to fluctuate from year to year (Atwood & Bontrager 2001), which further complicates any trend assessment. Winchell & Doherty (2008) estimated there were 1,324 (95 percent confidence interval: 976-1,673) gnatcatcher pairs over an 111,006-acre area on some public and quasi-public lands of Orange and San Diego counties.

In September 2010, the Service completed a 5-year review addressing the status of the gnatcatcher (Service 2010c). Please refer to this document for detailed information on the life history requirements, threats, and conservation needs.

Critical Habitat

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

PBFs of designated critical habitat for the gnatcatcher are those habitat components that are essential for the primary biological needs of foraging, nesting, rearing of young, intra-specific communication, roosting, dispersal, genetic exchange, or sheltering (Service 2007). These include: (1) dynamic and successional sage scrub habitats (i.e., Venturan coastal sage scrub, Diegan coastal sage scrub, Riversidean sage scrub, maritime succulent scrub, Riversidean alluvial fan scrub, southern coastal bluff scrub, and coastal sage-chaparral scrub) 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.

ENVIRONMENTAL BASELINE

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

Quino Checkerspot Butterfly and Santa Ana Sucker

Since the action area includes the jurisdiction of the CFWO and Quino and the federally listed sucker and their designated critical habitats are entirely within this area, the Environmental Baseline for these species and their designated critical habitats is the same as the Status of the Species.

Arroyo Toad

The Environmental Baseline for the arroyo toad is the same as for the Status of the Species, except that the San Antonio, Sisquoc, Upper Santa Ynez, Sespe, Piru, and Upper Santa Clara populations and units 2-6 of designated critical habitat are outside of CFWO jurisdiction.

Least Bell's Vireo

Of the estimated 2,968 vireo territories as of 2006, about 2,500 are in the jurisdiction of the CFWO, including the Tijuana, Dulzura, Jamul, Otay, Sweetwater, San Diego, San Luis Rey, Santa Margarita, and Santa Ana river/creek populations. The smallest number was found at the Dulzura Creek/Jamul River/Otay River population, which had 36 territories. For vireo designated critical habitat, the Environmental Baseline is the same as for the Status of the Species except it excludes the Santa Ynez River and Santa Clara River. Designated critical habitat in the Santa Ana River, Santa Margarita River, San Luis Rey River, San Diego River, Sweetwater River, Jamul-Dulzura creeks, and Tijuana River are entirely within the action area.

Coastal California Gnatcatcher

The Environmental Baseline for gnatcatcher is the same as for the Status of the Species, except that it excludes gnatcatchers that occur in Ventura and western Los Angeles counties, which center around and include the Moorpark area. Also, units 1-3, 5-10, and 12 of designated critical habitat are entirely within the action area, while unit most of unit 13 is outside the action area (i.e., 55,060 acres of 57,737 acres of designated critical habitat is outside the action area).

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat that will be added to the environmental baseline, along with the effects of other activities that are interrelated or interdependent with that action. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. Effects can be analyzed and found to be discountable or insignificant. Discountable effects are extremely unlikely to occur. Insignificant effects relate to the size of the impact and do not result in incidental take of a species.

Discountable and Insignificant Effects

The effect of fugitive dust on Quino and the potential for nonnative plants to increase within the action area and negatively affect Quino, arroyo toad, gnatcatcher, vireo, sucker and their associated critical habitats, where designated, were considered but determined to be reduced to a level of insignificance with the conservation measures committed to by FEMA.

Fugitive dust from project activities can negatively affect photosynthesis and decrease water-use efficiency of plants (Sharifi *et al*. 1997), including Quino host and nectar plants (PBF 1).

However, due to the temporal and small-scale nature of project activities and implementation of best management practices such as speed limits, covering potential wind-blown materials, and use of water or other binding materials during construction, impacts from dust on Quino should be insignificant.

Project activities have the potential to introduce nonnative plants to the action area by carrying seeds on vehicles, people, or equipment, and through ground disturbance. Ground disturbance can promote the establishment and spread of nonnative plants (Merriam *et al*. 2006). Such plants can degrade habitat quality for Quino and its critical habitat by competing with and replacing host and nectar plants (PBF 1), which is the greatest threat to Quino reserves (Service 2003). However, restoration of temporary impacts, in accordance with a plan reviewed and approved by the Service, best management practices, and use of a biological monitor will avoid or minimize the potential for the spread of nonnative species. Further, ground disturbance of Quino occupied habitat for a given project will be limited to 2 acres. Thus, the potential for impacts to Quino and its designated critical habitat due to nonnative plants is discountable.

Likewise, nonnative plants introduced by vehicles and ground disturbance, such as tamarisk (*Tamarix* species) and giant reed (*Arundo donax*), can stabilize stream terraces and deepen channels, affecting all four PBFs of designated critical habitat and making habitat unsuitable for arroyo toads (Service 1999). White sweet clover (*Melilotus alba*) and iceplant (*Mesembryanthemum* species) can result in the loss of arroyo toad upland habitat by covering stream terraces and creating densely vegetated areas that arroyo toads cannot move through, which will impact PBF 2 (riparian and upland habitats) and 4 (connectivity). Again, the conservation measures proposed to restore temporary impacts and to use best management practices and a biological monitor will avoid or minimize the spread of nonnative species. Thus, the potential for impacts to arroyo toads and its designated critical habitat due to nonnative plants is discountable.

Project activities that result in the introduction and/or spread of the nonnative plant species, particularly giant reed, can form dense stands that are unsuitable for vireos (Service 2002). The restoration of temporary impacts in accordance with a plan reviewed and approved by the CFWO, best management practices, and use of a biological monitor should effectively avoid or minimize the potential for the spread of nonnative species. In addition, project activities for a given project will be restricted to a maximum of 1 acre. Thus, the potential for impacts to vireo due to nonnative plants is discountable.

Establishment or spread of nonnative species such as tamarisk and giant reed and the loss of streamside riparian habitat can negatively affect habitat conditions for sucker via reduction in the availability of water (Stephenson & Calcarone 1999) and impact PBF 1 (functioning hydrological system), 3 (water depth and velocity), and 5 (water temperature) of sucker critical habitat. Native riparian vegetation provides cover and protection from predators and provides shade that can reduce water temperatures, which sucker tend to prefer[8]. Increased water

[8] Sucker prefer cooler water temperatures, but have been found in water between 59 degrees and 82 degrees Fahrenheit (Service 2010b).

temperatures could result in increased needs for food quantity and quality to survive and/or maintain growth rates (Lessard & Hayes 2003), leading to sucker death or injury. The conservation measures proposed to restore temporary impacts and to use best management practices and a biological monitor will address these impacts. Thus, the potential for impacts to sucker and its designated critical habitat due to nonnative plants is discountable.

Finally, construction and maintenance activities could result in the introduction and/or spread of nonnative plant species, such as annual grasses, that can alter the fire regime and result in the loss via conversion of suitable nesting habitat for gnatcatchers, As with the other species discussed, the restoration of temporary impacts, best management practices, and use of a biological monitor should effectively avoid or minimize the potential for the spread of nonnative species. Also, the impacts associated with a given project will be small scale (i.e., a maximum of 1 acre). Thus, the potential for impacts to gnatcatchers due to nonnative plants is discountable.

Quino Checkerspot Butterfly

The proposed projects have the potential to kill or injure Quino larvae and eggs via crushing. In addition to loss of individual Quino larvae, the destruction of Quino occupied habitat could harm Quino by reducing the availability of oviposition sites, larval food sources, pupal sheltering sites, and adult nectar sources within the action area.

However, impacts to host and nectar plants will be minimized by the maintenance of protective barriers and fencing. In addition, no permanent impacts to Quino occupied habitat will occur, no temporary or permanent impacts to core occurrences will occur, and temporary impacts will not result in more than 2 acres of ground disturbance of Quino occupied habitat for a given project. Further, not more than 50 acres of Quino occupied habitat will be impacted overall[9]. This represents a small proportion of occupied habitat for the species within the action area. In addition, the most important areas of Quino occupied habitat will be avoided (i.e., core occurrence complexes) unless impacts are determined to be insignificant via project-specific consultation (i.e., small impacts that will have a negligible effect on habitat quality for Quino). Although we do not have an accurate acreage estimate of occupied Quino habitat throughout the species range, the total proposed impacts will affect a small fraction of the available habitat. In addition, the restriction for each project will help ensure that no single population is significantly impacted to the extent that the viability of that population or the species as a whole is at risk. Restoration of temporary impacts to Quino habitat will occur in accordance with a restoration plan that is reviewed and approved by the CFWO prior to implementation of the proposed projects. Thus, the proposed action is not expected to appreciably reduce the numbers, distribution or reproduction of the species.

<u>Critical Habitat</u>

The proposed project could impact PBF 1 (host and nectar plants) via ground disturbance that destroys host and nectar plants. However, impacts to host and nectar plants will be minimized by the maintenance of protective barriers and fencing. In addition, impacts will be temporary, no

[9] Overall in this document means considering all the projects under the consultation combined.

more than 2 acres will be impacted for a given project, and no more than 50 acres of Quino habitat will be impacted overall, which represents a small proportion of the 62,125 acres of designated critical habitat. Further, monitoring, education of project personnel, and restoration of temporary impacts will occur in accordance with a plan reviewed and approved by the CFWO. Thus, no appreciable reduction in the ability of the critical habitat to provide for the survival and recovery of this species will occur.

Impact on Recovery

The proposed project does not conflict with the recovery actions or goals described in the Quino recovery plan (Service 2003). Maintaining as much Quino habitat as possible is considered necessary for the recovery of this species (Service 2003). However, only 50 acres of temporary impacts and no permanent impacts are expected under the proposed action. In addition, individual projects will not impact more than 2 acres. This small, temporary, and intermittent loss of habitat will not affect the long-term viability of the occurrence complexes or fragment Quino habitat within the action area or across recovery units. Thus, the proposed action will not significantly impact the ability of Quino to recover.

Arroyo Toad and its Designated Critical Habitat

Project activities could result in the crushing of individual arroyo toads, larvae, and eggs. In addition, mortality and injury can occur during the handling and relocation of arroyo toads. Also, the stress of relocation has the potential to make arroyo toad more susceptible to disease or predation.

However, staging areas will be kept out of arroyo toad occupied habitat, project personnel will be appropriately trained to minimize impacts, a biological monitor will help ensure measures to minimize impacts are implemented, and relocation of arroyo toads will occur to minimize direct impacts, as necessary. Further, permanent impacts to arroyo toad habitat will be avoided unless such impacts are determined to be insignificant via project-specific consultation (i.e., small impacts that will have a negligible effect on habitat quality for arroyo toads). Temporary impacts will be restricted to a total of 10 acres of occupied habitat, with no more than 1 acre of impact for each project. Given the amount of habitat available to arroyo toads in the action area and across its range, the proposed action will affect a small fraction of the available habitat rangewide or supporting any specific arroyo toad population. Although we do not have site-specific information regarding the distribution of arroyo toads within the project footprint, the proposed conservation measures and project-specific consultation will ensure that project activities do not have a disproportional impact on arroyo toad populations. Thus, only a fraction of arroyo toads within any affected population are anticipated to be injured or killed, and proposed activities will not appreciably reduce the numbers, distribution, or reproduction of the species.

Project activities could also impact water quality (PBF 1[10]) through accidental spills, which may result in mortality or injury to arroyo toads, and the introduction of contaminants into streams, which has the potential to increase nitrogen levels. Streams with enhanced nitrogen levels can

[10] PBF 1 includes water to provide space, food, and cover

cause death and developmental abnormalities in animals and impact prey populations (Rouse *et al*. 1999). In addition, dust and soil erosion from construction and ground disturbing activities near and within stream could impact stream water quality (PBF 1). This sedimentation can lead to the smothering of eggs and tadpoles (Rabeni & Smale 1995), filling of habitat, restriction of water flow, and the consequent reduction of oxygen levels. These effects vary depending on the amount of sediment introduced into the stream, the amount of stream flow, gradient, and several other instream factors.

However, measures are proposed to prevent spills and impacts to water quality via sedimentation, including development of project-specific erosion, spill, and hazardous material control plans; transport of pollutants off site; service and fueling of vehicles in upland areas; staging outside the floodplain during flood season; use of silt fencing and erosion control blankets, as appropriate; and removal of trash. Further, impacts will be restricted to 1 acre of occupied habitat per project and 10 acres of occupied habitat overall. Thus, impacts should be effectively minimized and not appreciably reduce the numbers, distribution, or reproduction of arroyo toads or the function of designated critical habitat in providing for the survival and recovery of arroyo toads.

Impact on Recovery

The proposed activities do not conflict with the recovery actions or goals described in the recovery plan because permanent loss of habitat is not expected. Further, the potential for impacts from the proposed activities are effectively minimized due to the proposed conservation measures. Finally, due to the proposed measures and project limitations, the number of arroyo toad that may be affected is a small proportion of the total and regional populations. Thus, the proposed action will not significantly impact the ability of arroyo toad to recover.

Least Bell's Vireo

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 including PBF 1 (riparian woodlands), reducing the availability of foraging and nesting resources. Vireos tend to show site fidelity and return to breeding territories in subsequent years (Service 1998). Thus, even destruction of habitat outside the breeding season could impact this species. Vireos 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. Vireos 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.

Project generated noise could also interfere with courtship behavior or cause temporary or permanent abandonment of the nesting territory (Gunn & Livingston 1974). Excessive noise can mask the song of a male vireo, thereby inhibiting his chance of attracting a mate (Scherzinger 1979). Excessive noise can also mask the presence of predators to the vireo (Shen 1983).

However, the proposed action includes use of an exclusionary buffer around nests during the breeding season, which should help minimize the potential impacts due to noise. In addition, for any specific project, impacts on vireo occupied or designated critical habitat will be limited to a maximum of 1 acre. Further, impacts from all the projects will be limited to a maximum of 20 acres of vireo occupied habitat or designated critical habitat, and no permanent loss of habitat is expected. Finally, impacts will be limited to 10 vireo territories, which is a small portion of the approximately 3,000 territories rangewide. Thus, impacts will be small in scale and impact a relatively small number of vireos. Impacts are also likely to be scattered throughout the range of the vireo and occur intermittent over the life of the project activities. Therefore, the proposed action is not expected to appreciably reduce the numbers, distribution or reproduction of the species or ability of critical habitat to provide for survival and recovery.

Impact on 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 vireos that may be affected is a small proportion of the total and regional populations. Thus, the proposed action will not significantly impact the ability of vireo to recover.

Santa Ana Sucker and its Designated Critical Habitat

Potential direct effects of this project to the sucker include the crushing of individuals. In addition, mortality and injury can occur during the handling and relocation of sucker. Also, the stress of relocation has the potential to make the sucker more susceptible to disease or predation. Finally, impingement on block nets and subsequent predation is a potential source of mortality.

However, staging areas will be kept out of sucker occupied habitat, project personnel will be appropriately trained to minimize impacts, a biological monitor will help ensure measures to minimize impacts are implemented, and relocation of sucker will occur, as necessary. Further, permanent impacts and impacts to sucker in the Santa Ana River will be avoided and temporary impacts will be restricted to a total of 0.5 mile of occupied habitat, but not more than 0.1 mile of occupied habitat for a given project. Thus, given the miles of habitat available to the sucker in Big Tujunga (13 miles) and the West, East, and North forks of the San Gabriel River (26 miles), which will represent a small proportion of the population in either watershed, and the relocation of potentially affected sucker to nearby suitable habitat, the proposed action will not appreciably reduce the numbers, distribution, or reproduction of the species.

Project activities could also impact water quality (PBF 4) through accidental spills, which may result in mortality or injury to Santa Ana sucker and food sources (PBF 6), and the introduction of contaminants into streams, which has the potential to increase nitrogen levels. Streams with enhanced nitrogen levels can cause death and developmental abnormalities in animals and impact prey populations (Rouse *et al*. 1999). In addition, dust and soil erosion from construction and ground disturbing activities near and within stream could impact stream water quality (PBF 4). This sedimentation can lead to the smothering of eggs (Rabeni & Smale 1995), filling of habitat, restriction of water flow, the consequent reduction of oxygen levels. The filling of habitat and the reduction of access to cobble/gravel substrates preferred by the sucker (Service 2005). These effects vary depending on the amount of sediment introduced into the stream, the amount of stream flow, gradient, and several other instream factors.

However, measures are proposed to prevent spills and impacts to water quality via sedimentation, including development of project-specific erosion, spill, and hazardous material control plans; transport of pollutants off-site; service and fueling of vehicle in upland areas; staging outside the floodplain during flood season; use of silt fencing and erosion control blankets, as appropriate; and removal of trash. Further, impacts will be restricted to 0.1 mile of occupied habitat or designated critical habitat per project and 0.5 mile of occupied or designated critical habitat overall. Thus, impacts should be effectively minimized and will not appreciably reduce the numbers, distribution, or reproduction of the species or ability of designated critical habitat to provide for its survival and reproduction.

<u>Impact on Recovery</u>

The proposed activities do not conflict with the recovery actions or goals described in the recovery plan because permanent loss of habitat is not expected. Further, the potential for impacts from the proposed activities are effectively minimized due to the proposed conservation measures. Finally, due to the proposed measures and project limitations, the number of sucker that may be affected is a small proportion of the total and regional populations. Thus, the proposed action will not significantly impact the ability of sucker to recover.

Coastal California Gnatcatcher

Since nests will be protected from direct impacts, eggs and nestlings will not be directly impacted under the proposed action. However, the proposed project could result in the removal of vegetation, reducing the availability of foraging and nesting resources for gnatcatchers. Thus, gnatcatchers 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. If displaced birds cannot find suitable habitat to forage and shelter in, they will be more vulnerable to predation and otherwise may die or be injured. Gnatcatchers 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.

Effects may also occur due to noise associated with project activities. Noise may interfere with courtship behavior or cause temporary or permanent abandonment of the nesting territory (Gunn & Livingston 1974). Excessive noise can mask the song of a male gnatcatcher, thereby inhibiting his chance of attracting a mate (Scherzinger 1979). Excessive noise can also mask the presence of predators to the gnatcatcher (Shen 1983).

However, the proposed action includes use of an exclusionary buffer during the breeding season, which should help minimize the potential impacts due to noise. In addition, for any specific project, temporary impacts on occupied 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 habitat and no permanent loss of habitat is expected. Further, impacts will be limited to 10 gnatcatcher territories[11]. Thus, impacts should be small in scale, spread out over the range of the species, and intermittent over the life of the project activities and the proposed action is not anticipated to appreciably reduce the numbers, distribution or reproduction of the species.

Critical Habitat

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 one 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.

Impact on Recovery

The proposed project does not conflict with the recovery actions or goals described in 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 the project activities. Further, the potential for impacts from the proposed activities are effectively minimized due to the proposed conservation measures. Finally, the number of gnatcatchers that may be affected is a small proportion of the total and regional populations. Thus, the proposed action will not significantly impact the ability of gnatcatcher to recover.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. We are unaware of

[11] Whether the level of impact to habitat in a given territory results in adverse effects will be determined on a case-by-case basis as specific projects are identified and submitted for project-level consultation.

any non-Federal actions affecting these species that are reasonably certain to occur in the action area considered by this opinion.

CONCLUSION

After reviewing the current status of the species, environmental baseline for the action area, effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of Quino, arroyo toad, vireo, sucker, and gnatcatcher and is not likely to result in the destruction or adverse modification of their designated critical habitats. Our conclusions are based on the following reasons:

1. FEMA proposes measures that should effectively minimize the impacts of project activities on these species and their designated critical habitats.

2. The proposed action affects a small proportion of the populations of these species across their range and of the designated critical habitats. Also, impacts to habitat will be temporary, small in scale, and intermittent over the duration of the project.

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 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 listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined as an intentional or negligent act or omission that 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 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.

The measures described below are non-discretionary, and must be undertaken by FEMA or made binding conditions of any grant issued, 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 fails to assume and implement the terms and conditions, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, FEMA or the project 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)].

AMOUNT AND EXTENT OF TAKE

Incidental take will be identified and exempted as individual projects are identified. This will be documented as the individual projects are submitted for consultation in accordance with this programmatic biological opinion. However, the overall amount of incidental take anticipated and exempted for each federally listed species addressed by this consultation is provided below.

Take of the Quino is anticipated and exempted as follows:

- Harm, death, or injury to individuals within 2 acres of occupied habitat for a given project and 50 acres overall.

Take of the arroyo toad is anticipated and exempted as follows:

- Harm, death, capture or injury to individuals within 1 acre of occupied habitat for a given project and 10 acres overall.

Take of the vireo is anticipated and exempted as follows:

- Harm, death, or injury to individuals within on1 acre of occupied habitat for a given project, 20 acres overall, and 10 territories.

Take of the sucker is anticipated and exempted as follows:

- Harm, death, capture, or injury to individuals within 0.1 mile of occupied habitat for a given project and 0.5 mile overall.

Take of the gnatcatcher is anticipated and exempted as follows:

- Harm, death, or injury to individuals within 1 acre of habitat for a given project, 20 acres overall, and 10 territories.

EFFECT OF TAKE

In the accompanying biological opinion, we determined that this level of anticipated take is not likely to result in jeopardy to Quino, arroyo toad, vireo, sucker, or gnatcatcher.

REASONABLE AND PRUDENT MEASURES

The following reasonable and prudent measures are necessary and appropriate to minimize, monitor, and report the effects of incidental take. The reasonable and prudent measures outlined below are nondiscretionary. Failure to comply may cause the protective coverage of section 7(o)(2) to lapse.

1. FEMA or their subapplicants will provide reports regarding the impacts to federally listed species.

2. FEMA or their subapplicants will ensure that impacts to arroyo toads and Santa Ana sucker are minimized during capture and relocation.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the FEMA must comply with terms and conditions, which implement the reasonable and prudent measures described above and outline reporting and monitoring requirements. Terms and conditions are non-discretionary.

To implement the reasonable and prudent measure 1 above, FEMA will adhere to the following terms and conditions:

1.1. FEMA will prepare and provide to the CFWO an annual report by March 15 summarizing all projects completed during the previous calendar year on implementation of this biological opinion. FEMA will require the subapplicants to provide a project report to the Service and FEMA with the following project-specific details on their respective projects within 45 days of project construction completion:

a. The number of Quino, arroyo toads, vireos, sucker and gnatcatchers found during a subapplicant's project, the date observed, their status when observed, and a map and GIS coordinates indicating their location when observed.

b. The total amount of occupied habitat disturbed and a description of restoration efforts for that occupied habitat.

c. Any observations of impacts to Quino, arroyo toad, vireo, sucker and gnatcatcher and a description of the nature of the impacts.

1.2 Prior to project construction, FEMA will require their subapplicants to submit to the CFWO Geographic Information System (GIS) shapefiles in UTM, Zone 11N (meters), NAD 83 coordinate system that show the following: anticipated permanent impacts, temporary impacts, habitat restoration sites, and habitat conservation sites. Please note that these polygons may overlap. For example, one location could be temporarily impacted and subsequently restored and conserved. Include the following metadata for each shapefile: summary/description of the data, attribute definitions, coordinate system/projection information or any other pertinent information. If there are any changes to the boundaries anticipated impacts, restoration, or conservation sites, such changes must be addressed consistent with the Reinitiation Notice below. In addition updated GIS shapefiles will be submitted to the CFWO.

To implement reasonable and prudent measure 2 above, FEMA or their subapplicants will adhere to the following term and condition:

2.1 At least 2 weeks prior to project activities, FEMA will require their subapplicants to submit the names and credentials of all individuals who are expected to handle arroyo toads or Santa Ana sucker to the CFWO for review and approval.

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. We have no conservation recommendations for this project.

REINITIATION NOTICE

This concludes formal consultation on the proposed action. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal 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.

If you have any questions regarding this document, please contact Jesse Bennett of this office at jesse_bennett@fws.gov; or 760-431-9440 extension 305.

Sincerely,

Scott A. Sobiech
Acting Field Supervisor

Appendices

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Appendix A

Concurrence with Not Likely to Adversely Affect Determinations

Southwestern Willow Flycatcher and Designated Critical Habitat

Flycatcher could be affected by removal of habitat and direct impacts to nests, nestlings, and eggs. They could also be affected by noise that disrupts breeding, feeding, and predator avoidance. In addition, the removal of flycatcher designated critical habitat could impact PBF 1 (i.e., riparian vegetation). However, no flycatcher occupied or designated critical habitat will be impacted, and appropriate buffers will be used to effectively minimize the potential for impacts due to noise. Thus, the potential for adverse effects is discountable.

California Least Tern and Light-Footed Ridgway's Rail

California least tern and light-footed Ridgway's rail could be affected by removal of habitat and direct impacts to nests, nestlings, and eggs. They could also be affected by noise that disrupts breeding, feeding, and predator avoidance. However, project activities in habitat for these species will occur outside the season of use for this species, and ground disturbance will be restricted to hand tools. Thus, impacts will not occur to nest, nestlings, and eggs, and impacts to habitat will have an insignificant effect on California least tern and light-footed Ridgway's rail. Further, project activities during the season of use will occur 800 feet away from California least tern habitat and 500 feet away from light-footed Ridgway's rail habitat, and only hand tools will be used. Thus, the potential for impacts due to noise and disturbance is discountable.

Tidewater Goby

Tidewater goby and its designated critical habitat could be affected by removal of habitat, changes to hydrology, impacts to water quality, and direct impacts to individuals. However, impacts to individuals and occupied habitat within the CFWO's jurisdiction will be avoided, best management practices will be used to minimize the potential for impacts due to runoff, and all impacts will be temporary and subject to restoration. Thus, impacts will be insignificant.

San Diego and Riverside Fairy Shrimp

San Diego and Riverside fairy shrimp and designated critical habitats could be affected by removal of habitat and direct impacts to individuals. They could also be affected by contaminated runoff that results in impacts to water quality. However, project activities in habitat will occur outside pool basins, best management practices will be used to minimize the potential for impacts due to runoff, and all impacts to areas surrounding pool habitats will be temporary and subject to restoration. Thus, the potential for impacts is discountable.

Western Snowy Plover

Western snowy plover could be affected by removal of habitat and direct impacts to nests, nestlings, and eggs. They could also be affected by noise that disrupts breeding, feeding, and predator avoidance. However, project activities in habitat for these species will be restricted to hand tools, and temporary impacts will be restored. Thus, impacts due to habitat loss will be insignificant. Also, a biological monitor will be used to ensure that impacts to breeding western snowy plovers are avoided, as appropriate. Human activities and use of hand tools during the non-breeding season are may result in minor disturbance or displacement of overwintering birds, but these activities are not anticipated to substantially impact western snowy plover survival or reproduction. Thus, the potential for impacts to nests, nestlings, and eggs or due to noise and disturbance is discountable.

Appendix B

Southwestern Willow Flycatcher

SWWF 1 Habitat Assessment: A habitat assessment will be conducted by a biologist to determine whether suitable habitat (including foraging, nesting, and dispersal) for the flycatcher 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 flycatcher, the CFWO will be contacted regarding the need for surveys according to Service protocol and those surveys will be conducted, as appropriate. Otherwise, if the CFWO agrees based on other biological data or reasoning, the species will be determined present in areas with suitable habitat.

SWWF 2 Habitat Buffer: If project activities are conducted during the breeding season (i.e., May 1-September 1), a 500-foot disturbance-free buffer will be established and demarcated by fencing or flagging around occupied habitat. This buffer may be adjusted provided noise levels do not exceed 60 dBA at the edge of the nest site. If the noise meets or exceeds the 60 dBA threshold, or if the biologist determines that the construction activities are disturbing nesting activities, the biologist will have the authority to halt the construction and will devise methods to reduce the noise and/or disturbance in the vicinity.

SWWF 3 No Permanent or Temporary Loss of Habitat: No permanent or temporary loss of flycatcher occupied or designated critical habitat will occur (within or outside of the breeding season).

California Least Tern Conservation Measures

CLT 1 Seasonal Avoidance and Habitat Buffer: To avoid the nesting season of the California least tern, project activity in occupied habitat will be limited to the time period from September 30-March 31. If project activities occur during the nesting season, they will occur at least 800 feet away from California least tern occupied habitat, and noise within occupied habitat will be monitored to ensure that it does not exceed 60 dBA.

CLT 2 Biological Monitor: A Service-approved biologist will monitor all construction activities within occupied habitat to ensure that no harm, death, or injury of the species or destruction of occupied habitat occurs. The Service-approved biologist will have stop work authority if adverse effects of nesting California least terns or light-footed Ridgway's rails are observed or are likely to occur.

CLT 3 Use of Handheld Tools: Non-breeding season project activity in occupied habitat will be limited to the use of handheld tools, including handheld motorized implements such as chain saws and power augers. Tools will be washed prior to use in these habitats to reduce the potential for spread of nonnative plant species and their seeds. No heavy equipment will be allowed within suitable nesting habitats.

CLT 4 Habitat Protection: No soil stabilization materials or off-site materials (e.g., decomposed granite, soil, rocks, etc.) will be added to the surface within occupied habitat. No excavation or grading will occur within occupied habitat either.

CLT 5 Flagging: When necessary to minimize the area affected by the project, work site boundaries will be marked with flagging or other visible materials, which will be removed at the conclusion of the project.

CLT 6 Avoid Creation of Predator Perches: Workers will avoid temporary or permanent placement of structures (e.g., posts, railings, tall equipment, or fence lines) that could provide elevated perches for predatory birds near or within occupied habitat.

CLT 7 Access Restrictions: Access to work sites in occupied habitat will be by foot travel only. Motorized vehicles, including all-terrain vehicles, will not be used in occupied habitat.

CLT 8 Restoration of Disturbed Areas: At the conclusion of the project, areas temporarily affected by project activity will be restored to their pre-project condition (for example, footpaths will be raked to their original ground contour and native vegetation will be reestablished, if necessary).

CLT 9 Waste Management: Trash, food, food containers, and food waste will be secured at all times by individual workers, or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.

CLT 10 Guidance on Handheld Equipment: If handheld motorized tools are used, operators will employ best management practices to avoid and minimize soil and water contamination from fuel and lubricants. Measures include: a) use spill-resistant fuel and lubricant containers; b) use a portable containment pad for re-fueling in the field; c) immediately report petroleum spills to the landowner, or land management agency, and notify appropriate local authorities for advice and action on containment and cleanup of spills; and d) clearly mark the location and/or boundaries of the spill site to enable rapid remedial action.

Light-Footed Ridgway's Rail Conservation Measures

LFRR 1 Habitat Assessment: A habitat assessment will be conducted by a biologist to determine whether suitable habitat (including foraging, nesting, and dispersal habitat) for the light-footed Ridgway's rail 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 light-footed Ridgway's rail, the CFWO will be contacted regarding the need for additional surveys, and those surveys will be conducted, as appropriate. Otherwise, if the CFWO agrees based on other biological data or reasoning that the area is likely occupied, measures 1 through 12 will be implemented in areas with suitable habitat.

LFRR 2 Seasonal Avoidance: To avoid the nesting season of the light-footed Ridgway's rail, project activity in occupied habitat will be allowed from September 16-March 14. If project activities occur during the nesting season, they will occur at least 500 feet away from light-footed Ridgway's rail occupied habitat, and noise within occupied habitat will be monitored to ensure that it does not exceed 60 dBA.

LFRR 3 Biological Monitor: A Service-approved biologist will monitor all construction activities within occupied habitat to ensure that no harm, death, or injury of the species or destruction of occupied habitat occurs. The Service-approved biologist will have stop work authority if adverse effects of nesting light-footed Ridgway's rails are observed or are likely to occur.

LFRR 4 Limits on Mechanized Equipment: Non-breeding season project activity in occupied habitat will be limited to the use of handheld tools, including handheld motorized implements such as chain saws and power augers. Tools will be washed prior to use in these habitats to reduce the potential for spread of nonnative plant species and their seeds. No heavy equipment will be allowed within suitable nesting habitats.

LFRR 5 Soil/Surface Protection: No soil stabilization materials or off-site materials (e.g., decomposed granite, soil, rocks, etc.) will be added to the surface within occupied habitat. No excavation or grading will occur within occupied habitat either.

LFRR 6 Guidance on Handheld Equipment: If handheld motorized tools are used, operators will employ best management practices to avoid and minimize soil and water contamination from fuel and lubricants. Measures include: a) use spill-resistant fuel and lubricant containers; b) use a portable containment pad for re-fueling in the field; c) immediately report petroleum spills to the landowner, or land management agency, and notify appropriate local authorities for advice and action on containment and cleanup of spills; and d) clearly mark the location and/or boundaries of the spill site to enable rapid remedial action.

LFRR 7 Site Flagging: When necessary to minimize the area affected by the project, work site boundaries will be marked with flagging or other visible materials, which will be removed at the conclusion of the project.

LFRR 8 Avoid Creation of Predator Perches: Workers will avoid temporary or permanent placement of structures (e.g., posts, railings, tall equipment, or fence lines) that could provide elevated perches for predatory birds near or within occupied habitat.

LFRR 9 Site Restriction: Access to work sites in occupied habitat will be by foot travel only. Motorized vehicles, including all-terrain vehicles, will not be used in occupied habitat.

LFRR 10 Restoration of Disturbed Areas: At the conclusion of the project, areas temporarily affected by project activity will be restored to their pre-project condition (for example, footpaths will be raked to their original ground contour and native vegetation will be reestablished, if necessary).

LFRR 11 Waste Management: Trash, food, food containers, and food waste will be secured at all times by individual workers, or placed in animal-proof trash containers that are located at the work site. The contents of trash containers will be transferred from the work site at the end of each day.

LFRR 12 Hydrology and Topography Protection: Project activities will avoid creation of berms and dykes, steepening of channel slopes, placement of rock slope protection, and other actions that could result in alteration of hydrology, changes to water surface elevation levels, increased flooding, changes to flow velocities, and increased scour within light-footed Ridgway's rail occupied habitat.

Tidewater Goby

TIGO 1 Installation of In-water Nets: Prior to initiation of dewatering or sediment removal work, a Service-approved 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.

TIGO 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 ESA and FEMA funding conditions.

TIGO 3 Capture and Relocation: Once the block nets are secured, a Service-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. 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.

TIGO 4 Flagging: 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.

TIGO 5 Erosion 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.

TIGO 6 Biological Monitor: A Service-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.

TIGO 7 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).

TIGO 8 Hydrology and Topography Protection: Project activities will avoid creation of berms and dykes, steepening of channel slopes, placement of rock slope protection, and other actions that could result in alteration of hydrology, changes to water surface elevation levels, increased flooding, changes to flow velocities, and increased scour within tidewater goby designated critical habitat. However, the in-kind replacement of existing or damaged rock slope protection may occur.

TIGO 9 Limits on Habitat Disturbance: Project activities will not result in permanent loss of tidewater goby designated critical habitat unless the impacts to habitat are determined to be insignificant via project-level consultation (i.e., small permanent impacts that will have a negligible effect on habitat quality for tidewater goby).

TIGO 10 Limits on Habitat Disturbance: Project activities will not adversely affect tidewater gobies or their occupied habitat on or near Marine Corps Base Camp Pendleton.

TIGO 11 Reinitiation with New Information: If tidewater gobies are located within CFWO's jurisdiction outside Marine Corps Base Camp Pendleton, this consultation will be reinitiated if project activities may affect tidewater gobies at these locations.

San Diego and Riverside Fairy Shrimp Conservation Measures

VPBR 1 Habitat Assessment: For habitat not known to be occupied by the San Diego fairy shrimp and/or Riverside fairy shrimp:

a. A habitat assessment will be conducted by a biologist to determine whether suitable habitat for the San Diego fairy shrimp and Riverside fairy shrimp occurs in the action area. If suitable habitat for these species is identified in the action area and the proposed project may affect suitable habitat that is not known to be occupied by the San Diego fairy shrimp and Riverside fairy shrimp, the CFWO will be contacted regarding the need for surveys according to the Service protocol, and those surveys will be conducted, as appropriate. Otherwise, if the CFWO agrees based on other biological data or reasoning that the area is likely occupied, measures 1 through 10 will be implemented in areas with suitable habitat.

VPBR 2 Biological Monitor: For occupied and designated critical habitat for San Diego fairy shrimp and/or Riverside fairy shrimp (fairy shrimp habitat):

a. A Service-approved biologist will monitor all construction activities within 150 feet of fairy shrimp habitat to ensure that listed fairy shrimp are not harmed, injured, or killed and fairy shrimp habitat is not impacted or destroyed.

VPBR 3 Seasonal Avoidance: Construction within 150 feet of fairy shrimp habitat will be performed from June 1 to October 15 and under dry conditions to the maximum extent feasible.

VPBR 4 Fencing: If any construction activities must occur during October 15-June 1, exclusion fencing and erosion control materials will be used to reduce sedimentation of adjacent vernal pools and other seasonal wetlands as determined by a Service-approved biologist. All fiber rolls and hay bales used for erosion control will be certified as free of noxious weed seed.

VPBR 5 Buffers: Activities within 150 feet of fairy shrimp habitat will be avoided to the maximum extent possible. A Service-approved biologist will flag or monitor all work activities from October 15 to June 1 within 150 feet of fairy shrimp habitat. The following buffers will be used during this timeframe:

a. Hand-held herbicide application will not occur within 25 feet of habitat;

b. Broadcast or power spray herbicide application will not occur within 150 feet of habitat;

c. Manual clearing of vegetation will not occur within pool basins;

d. Mechanical clearing of vegetation and ground-disturbing activities will not occur within 100 feet of habitat; and

e. A buffer of at least 300 feet from habitat will be established for the staging areas of all equipment for storage, fueling, and maintenance with hazardous material absorbent pads available in the event of a spill; and mixing of pesticides, herbicides, or other potentially toxic chemicals.

VPBR 6 Vehicle Inspections: Vehicles will be inspected daily for fluid leaks before leaving a staging area.

VPBR 7 Vernal Pool Habitat Protection: The following best management practices will be implemented within or near fairy shrimp habitat:

a. Any vernal pool, vernal pool grassland, or seasonal wetland will be protected from siltation and contaminant runoff by use of erosion control.
b. Erosion-control materials will be of a tightly woven natural fiber netting or similar material that will not entrap other wildlife species (e.g., coconut coir matting). No micro-filament netting will be used.
c. Erosion-control measures will be placed between the outer edge of the buffer and the activity area. All fiber rolls and hay bales used for erosion control will be certified as free of noxious weed seed.
d. The subapplicant will implement dust control measures necessary to prevent the transport of soil from exposed surfaces to vernal pool, swale, and rock pool habitat. Sprinkling with water will not be done in excess to minimize the potential for non-storm water discharge.
e. To minimize the introduction of nonnative plant species, construction vehicles will be cleaned prior to any work within 150 feet of fairy shrimp habitat.

VPBR 8 Restoration Plan: Restoration of temporary impacts will occur in accordance with a restoration plan that is reviewed and approved by the CFWO prior to implementation of the proposed project. Specifically, when restoring areas to pre-project condition, native plants will be used to the maximum extent possible.

VPBR 9 No Permanent Loss of Habitat: No permanent impacts to fairy shrimp habitat will occur. Actions that result in permanent alteration of pool hydrology (e.g., construction of culverts, v-ditches, berms, roads, pipes, etc., that will divert flows from pools basins) will be avoided and are not addressed by this programmatic consultation.

VPBR 10 Habitat Disturbance Limits: No more than 5 percent of habitat within a given complex or unit of designated critical habitat or overall under this consultation will be temporarily impacted by the proposed project. Direct impacts will occur outside of pool basins.

Western Snowy Plover

The following avoidance and minimization measures apply to Action Areas within suitable snowy plover nesting habitat and designated critical habitat regardless of whether snowy plovers have been detected during Service-approved protocol surveys.

WSP 1 Seasonal Avoidance: Project construction activities in suitable nesting habitat will occur during the species non-breeding season: the period beginning October 1 and continuing through February 28 of the following year or through February 29 in a leap year.

WSP 2 Use of Handheld Tools Only: Project construction activities in suitable nesting habitat will be limited to the use of handheld tools, including handheld motorized implements such as chain saws and power augers. No heavy equipment will be allowed within suitable nesting habitat.

WSP 3 Guidelines for Handheld Tools: If handheld motorized implements are used, operators will employ best management practices to avoid and minimize soil and water contamination from fuel and lubricants. Measures include:

a. Use spill-resistant fuel and lubricant containers;
b. Consider the use of a portable containment pad for re-fueling in the field;
c. Immediately report petroleum spills to the landowner, or land management agency, and notify appropriate local authorities for advice and action on containment and cleanup of spills; and
d. Clearly mark the location and/or boundaries of the spill site to enable rapid remedial action.

WSP 4 Biological Monitor: If project construction activities occur in adjacent to, but not within suitable nesting habitat, then project activities will be conducted during the species non-breeding season, if possible. If non-breeding season construction is not possible, then the Subapplicant will employ a Service-approved biologist to conduct weekly western snowy plover surveys. If western snowy plovers are observed, the Service-approved biologist will notify the Service within 1 day of the observation and will monitor all construction activities conducted adjacent to western snowy plovers suitable nesting habitat. The qualified biologist will have the right and responsibility to stop work if adverse effects of nesting western snowy plovers are observed.

WSP 5 Flagging: When necessary to minimize the area affected by the project, the Subapplicant or their contractors will mark the work site boundaries with flagging or other visible materials, and remove those markers at the conclusion of the project.

WSP 6 Avoid Placement of Predator Perches: Workers will avoid temporary or permanent placement of structures (e.g., posts, railings, tall equipment, or fence lines) that could provide elevated perches for predatory birds.

WSP 7 Access Restrictions: Access to work sites will be by foot travel only. Motorized vehicles, including all-terrain vehicles, are not permitted on work sites located within suitable nesting habitat.

WSP 8 Site Restrictions: Vehicles used for transport of personnel will be restricted to existing parking lots or roadside parking areas.

WSP 9 Restore Contours of Temporarily Disturbed Areas: At the conclusion of the project, areas temporarily impacted by project activity will be restored to their pre-project condition (for example, footpaths are to be raked to their original ground contour and cut vegetation is to be removed or piled for future disposal).

WSP 10 Waste Management: Trash, food, food containers, and food waste will be secured at all times by individual workers, or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.

WSP 11 Prohibition of Pets Onsite: Pets will be prohibited from all work sites.