Programmatic Biological and Conference Opinion

California Statewide Programmatic Restoration Effort

FWS Reference: 2022-0005149-S7

US Fish and Wildlife Service Region 8, US Army Corps of Engineers (Los Angeles, Sacramento, and San Francisco Districts), and National Oceanic and Atmospheric Administration - Restoration Center, California

Lead Agency for Consultation Purposes:

U.S. Fish and Wildlife Service

Region 8

Sacramento, CA

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U.S. Fish and Wildlife Service

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Sacramento, California

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a. ACRONYMS AND ABBREVIATIONS

AECOM	AECOM Technical Services, Inc.
Bd	*Batrachochytrium dendrobatidis*
BLM	United States Bureau of Land Management
BMP	best management practice
Cal-IPC	California Invasive Plant Council
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CEPA	California Environmental Protection Agency
CFR	Code of Federal Regulations
CH	Critical Habitat
Clean Water Act	federal Water Pollution Control Act, as amended
CNDDB	California Natural Diversity Database
CNRA	California Natural Resources Agency
CVJV	Central Valley Joint Venture
DAP	Delegated Authority Program
DARRP	Damage Assessment Remediation and Restoration Program
Delta	Sacramento-San Joaquin Delta
DO	dissolved oxygen
DPS	distinct population segment
ECOS	Environmental Conservation Online System
EPA	Environmental Protection Agency
ESA	federal Endangered Species Act of 1973, as amended
ESAF	environmentally sensitive area fencing
FAC	USFWS Fish and Aquatic Conservation Program
FHWG	Fisheries Hydroacoustic Working Group
GPM	General Protection Measure
GPS	global positioning system
HACC	Herpetological Animal Care and Use Committee
HQ	hazard quotient
IPaC	Information for Planning and Consultation
IPM	integrated pest management

ITS	Incidental Take Statement
LAA	ESA determination of may affect, and is likely to adversely affect
LC50	The concentration of a toxin that will kill 50% of organisms exposed to it
LOP	Limited Operating Periods
Mph	miles per hour
NOAEL	No Observed Adverse Effect Level
NOEC	No Observed Effect Concentration
NLAA	ESA determination of may affect, but is not likely to adversely affect
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRF	nesting, roosting, or foraging
NTU	Nephelometric Turbidity Unit
PCA	Pest Control Advisor
PBF	physical and biological features
PCE	primary constituent element
PBA	Programmatic Biological Assessment
PBO	Programmatic Biological and Conference Opinion
RC	Restoration Center
Refuge	National Wildlife Refuge System
RSP	rock slope protection
SCC	California State Coastal Conservancy
SERA	Syracuse Environmental Research Associates, Inc.
State Water Board	State Water Resources Control Board
Statewide Multi-Agency Effort	Statewide Multi-Agency Implementation of Restoration Projects
SWPPP	storm water pollution prevention plan
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USFWS ES	United States Fish and Wildlife Service Ecological Services
USGS	United States Geological Survey
WEF	Wildlife Exclusion Fencing

b. DEFINITIONS

Action Area is defined in the ESA as "all areas to be affected directly or indirectly by the Federal Action and not merely the area involved in the action" (50 Code of Federal Regulations [CFR] Part 402.02). The Action Area in this programmatic biological assessment (PBA) includes the entire state of California (Figure 1).

Activity is a specific element or treatment associated with a project.

Assumed presence*,* a species will be assumed present in an area when suitable habitat is present within the current range of the species and their absence has not been determined by a negative finding using protocol level surveys.

Covered Species are the subset of animal and plant species in the Action Area that are federally-listed under the ESA and that consultation under section 7(a)(2) of the ESA is requested via the PBA.

Effects of the action The effects analysis evaluates 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. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. 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 (see 50 CFR § 402.17

Enhancement is defined as the manipulation of the physical or biological characteristics of a resource to heighten, intensify, or improve one or more specific functions (USACE 2008).

Environmentally Sensitive Area Fencing *(ESAF)* is defined as fencing installed around sensitive Covered Species habitat.

ESA Section 7(a)(2) Review Form is an application checklist form that will be completed by the Project Proponent and used to request coverage under the programmatic biological and conference opinion (PBO) from the United States Fish and Wildlife Service (USFWS) Ecological Services (ES).

Establishment (creation) means the manipulation of the physical, chemical, or biological characteristics present to develop a resource that did not previously exist (USACE 2008).

Federal Action as it relates to the PBO is issuance of a permit under Section 404 of the federal Water Pollution Control Act (Clean Water Act) and/or Sections 10 and/or 14 (33 United States Code [U.S.C.] 408, known as Section 408) of the Rivers and Harbors Act of 1899, funding from National Oceanic and Atmospheric Administration (NOAA) Restoration Center (RC) and/or USFWS, or carried out by the USFWS. Further details on the process of accommodating federal agencies not originally involved in the PBA are provided in Section 1 of this PBO.

Federal Action Agencies are the agencies requesting consultation under section 7(a)(2) of the ESA. These agencies include NOAA RC, United States Army Corps of Engineers (USACE), and USFWS.

General Protection Measures *(GPMs)* support avoidance and/or minimization of effects to all Covered Species and their habitats. Where appropriate, these measures are designed to be applied based on the type of restoration project being undertaken and the specific tools being used to accomplish the project.

Late-Arriving Action Agency is a federal agency that would like to request section 7(a)(2) ESA consultation with USFWS that is not a part of this programmatic consultation (see Section 2.11, *Late-Arriving Federal Agencies*).

Lead Action Agency could be NOAA RC, USACE, or USFWS, depending on a proposed restoration project's permitting and funding. For individual proposed restoration projects, NOAA RC and/or USFWS may serve as the Lead Action Agency through their funding for restoration efforts, including the USFWS Fish and Aquatic Conservation (FAC) Program; the National Wildlife Refuge System (the Refuge), Central Valley Joint Venture (CVJV), Coastal, and Partners programs; NOAA's Community-Based Restoration Program; and NOAA's Damage Assessment Remediation and Restoration Program (DARRP). USACE may serve as a Lead Action Agency for proposed restoration projects included in the Proposed Restoration Effort when the project requires authorization by USACE under Section 404 of the Clean Water Act and/or Sections 10 and/or 14 (33 U.S.C. 408 [Section 408]) of the Rivers and Harbors Act of 1899.

Post-Construction Report Form (Appendix B) is used to document that the project was implemented as described on the approved ESA Section 7(a)(2) Review Form (Appendix A) and to help track incidental take and revegetation success.

Project is a set of restoration activities proposed for a specific location by a Project Proponent.

Project Proponent includes a variety of private individuals; nonprofit organizations; for-profit organizations; public utilities; and federal, state, and local government agencies.

Proposed Action (Proposed Restoration Effort) **i**ncludes a variety of aquatic and riparian restoration project types, design guidelines, and appropriate protection measures.

Proposed Restoration Project includes any one of a wide variety of eligible restoration projects, including projects that are part of larger programs or initiatives that guide restoration throughout the state of California. The project would be proposed and implemented by the Project Proponent. A proposed restoration project may include multiple benefits, such as groundwater recharge, recreation, flood management, or climate change adaptation. A proposed restoration project includes an eligible project type and relevant protection measures that will result in a net increase in aquatic or riparian resource functions and/or services (Section 4.2, *Prohibited Activities*; Section 4.3, *Eligible Project Types and Design Guidelines*).

A ***Qualified Biologist*** is one (or more) biologist meeting specific qualifications identified under protection measure ASP-1, *Qualifications of the Qualified Biologist and USFWS-Approved*

Biologist, provided in Section 5.1.5, *All-Species Protection Measures.* It is the responsibility of the Project Proponent to ensure that their biologist meets the specified qualifications.

Species Protection Measures are avoidance and/or minimization measures developed specifically to address individual Covered Species or Covered Species guilds, based on unique life history and habitat requirements. These measures are applicable to proposed restoration projects, based on the habitats identified at the project site and the Covered Species with potential to be affected by Proposed Restoration Project activities.

The Statewide Multi-Agency Implementation of Restoration Projects (***Statewide Multi-Agency Effort***) is a coordinated effort between state and federal agencies in California to create a more efficient regulatory review process for a comprehensive set of aquatic/riparian restoration project categories, design guidelines, and protection measures.

A ***USFWS-Approved Biologist*** is one (or more) biologist meeting specific qualifications identified under protection measure ASP-1, *Qualifications of the Qualified Biologist and USFWS-Approved Biologist*, provided in Section 5.1.5, *All-Species Protection Measures*, and as noted for individual species in the subsequent protection measures. The Project Proponent must submit résumés for all proposed USFWS-Approved Biologists to USFWS for their review and approval (ESA Section 7(a)(2) Review Form).

A ***USFWS Field Office*** is a USFWS Fish and Wildlife Office. There are Field Offices throughout California; they include USFWS Fisheries Offices and Ecological Services Offices. Field Offices include staff that conduct ESA Section 7 regulatory compliance.

Wildlife Exclusion Fencing *(WEF)* is defined as fencing used to exclude Covered Species from a construction site or work area, thereby reducing potential harm.

1. INTRODUCTION

This document is the U.S. Fish and Wildlife Service's (USFWS) Programmatic Biological and Conference Opinion (PBO) on the Statewide Programmatic Biological Assessment for Restoration: Multi-Agency Implementation of Aquatic, Riparian, Floodplain and Wetland Restoration Projects to Benefit Fish and Wildlife in California (PBA) (USFWS 2022). The PBA was developed by the USFWS, US Army Corps of Engineers (USACE) and the National Oceanic and Atmospheric Administration's Restoration Center (NOAA RC) (collectively, the Action Agencies).

This document was prepared in accordance with regulations on interagency cooperation (50 CFR 402) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq*.), (as amended) (ESA), for species under the jurisdiction of the USFWS. On July 5, 2022, the U.S. District Court of the Northern District Court of California (the Court) vacated the 2019 regulations implementing section 7 of the ESA. As a result of the Court's vacatur order, the 2019 regulations are no longer in effect, and the Service has relied upon the pre-2019 regulations in rendering this biological opinion. However, because of the possibility the Court's vacatur could be stayed pending appeal or, ultimately, overturned on appeal, we considered whether our substantive analyses and conclusions for purposes of this consultation would have been different if the 2019 regulations were applied. Our analysis included the prior definitions of "effects of the action," among other prior terms and provisions. We considered all the consequences of the action that would not have occurred but for the action and are reasonably certain to occur when determining the "effects of the action." As a result, we determined the analysis and conclusions would have been the same, irrespective of which regulations applied.

The request for formal consultation was received by USFWS Ecological Services Pacific Southwest Region on June 14, 2022, for the species and critical habitat identified in Table 1 below. Please note that Table 1 differentiates among Distinct Population Segments for organizational purposes; thus, the term "species" is used loosely. A distinct population segment (DPS) is a vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species. Foothill yellow-legged frog DPSs are also differentiated in Table 1 and the four Foothill yellow-legged frog DPSs are proposed under the Act. Thus, this PBO serves as conference opinion for these four DPSs. As a result, the term "Covered Species" is used throughout the PBA and this PBO to refer to the species and critical habitat (CH) identified in Table 1.

Table 1: Species and Critical Habitat Analyzed in PBO

Species Common Name	**Species Latin Name**	**ESA Status**	**Critical Habitat**
Amphibians			
arroyo (=arroyo southwestern) toad	*Anaxyrus californicus*	E	Yes
California red-legged frog	*Rana draytonii*	T	Yes
California tiger salamander – Central California DPS	*Ambystoma californiense*	T	Yes
California tiger salamander – Santa Barbara County DPS	*Ambystoma californiense*	E	Yes
foothill yellow-legged frog – Central Coast DPS	*Rana boylii*	PT	N/A
foothill yellow-legged frog – North Feather DPS	*Rana boylii*	PT	N/A
foothill yellow-legged frog – South Coast DPS	*Rana boylii*	PE	N/A
foothill yellow-legged frog – Southern Sierra DPS	*Rana boylii*	PE	N/A
mountain yellow-legged frog – northern California DPS	*Rana muscosa*	E	Yes
Santa Cruz long-toed salamander	*Ambystoma macrodactylum croceum*	E	N/A
Sierra Nevada yellow-legged frog	*Rana sierrae*	E	Yes
Yosemite toad	*Anaxyrus canorus*	T	Yes
Reptiles			
Alameda whipsnake	*Masticophis lateralis euryxanthus*	T	Yes
giant garter snake	*Thamnophis gigas*	T	N/A
San Francisco garter snake	*Thamnophis sirtalis tetrataenia*	E	N/A
Birds			
California least tern	*Sterna antillarum browni*	E	N/A
California clapper rail	*Rallus longirostris obsoletus*	E	N/A
coastal California gnatcatcher	*Polioptila californica*	T	Yes
least Bell's vireo	*Vireo bellii pusillus*	E	Yes
light-footed Ridgway's rail	*Rallus obsoletus levipes*	E	N/A
marbled murrelet	*Brachyramphus marmoratus*	T	Yes
northern spotted owl	*Strix occidentalis caurina*	T	Yes
western snowy plover – Pacific Coast population DPS	*Charadrius nivosus* ssp. *nivosus*	T	Yes
Mammals			
riparian woodrat	*Neotoma fuscipes riparia*	E	N/A
riparian brush rabbit	*Sylvilagus bachmani riparius*	E	N/A
salt marsh harvest mouse	*Reithrodontomys raviventris*	E	N/A
San Bernardino Merriam's kangaroo rat (*Critical Habitat Only*)	*Dipodomys merriami parvus*	E	Yes

Invertebrates			
California freshwater shrimp	*Syncaris pacifica*	E	N/A
Conservancy fairy shrimp	*Branchinecta conservatio*	E	Yes
longhorn fairy shrimp	*Branchinecta longiantenna*	E	Yes
Mount Hermon June beetle	*Polyphylla barbata*	E	N/A
Riverside fairy shrimp	*Streptocephalus woottoni*	E	Yes
San Diego fairy shrimp	*Branchinecta sandiegonensis*	E	Yes
Smith's blue butterfly	*Euphilotes enoptes smithi*	E	N/A
valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	T	Yes
vernal pool fairy shrimp	*Branchinecta lynchi*	T	Yes
vernal pool tadpole shrimp	*Lepidurus packardi*	E	Yes
Fish			
Delta smelt	*Hypomesus transpacificus*	T	Yes
Lahontan cutthroat trout	*Oncorhynchus clarkii henshawi*	T	N/A
tidewater goby	*Eucyclogobius newberryi*	E	Yes
unarmored threespine stickleback	*Gasterosteus aculeatus williamsoni*	E	N/A
Non-vernal pool Plant Species			
Ben Lomond spineflower	*Chorizanthe pungens* var. *hartwegiana*	E	N/A
California seablite	*Suaeda californica*	E	N/A
La Graciosa thistle	*Cirsium loncholepis*	E	Yes
marsh sandwort	*Arenaria paludicola*	E	N/A
salt marsh bird's-beak	*Cordylanthus maritimus* ssp. *maritimus*	E	N/A
Ventura marsh milk-vetch	*Astragalus pycnostachyus* var. *lanosissimus*	E	Yes
Vernal Pool Plant Species			
Butte County meadowfoam	*Limnanthes floccosa* ssp. *californica*	E	Yes
California Orcutt grass	*Orcuttia californica*	E	N/A
Contra Costa goldfields	*Lasthenia conjugens*	E	Yes
few-flowered navarretia	*Navarretia leucocephala* ssp. *pauciflora*	E	N/A
fleshy owl's-clover	*Castilleja campestris* ssp. *succulenta*	T	Yes
hairy Orcutt grass	*Orcuttia pilosa*	E	Yes
Hoover's spurge	*Chamaesyce hooveri*	T	Yes
Otay Mesa-mint	*Pogogyne nudiuscula*	E	N/A
Sacramento Orcutt grass	*Orcuttia viscida*	E	Yes
San Diego ambrosia	*Ambrosia pumila*	E	Yes
San Diego button-celery	*Eryngium aristulatum* var. *parishii*	E	N/A
San Joaquin Orcutt grass	*Orcuttia inaequalis*	T	Yes
slender Orcutt grass	*Orcuttia tenuis*	T	Yes
spreading navarretia	*Navarretia fossalis*	T	Yes
thread-leaved brodiaea	*Brodiaea filifolia*	T	Yes

E = Federally Endangered under the ESA
PE = Proposed Endangered under the ESA
T = Federally Threatened under the ESA
PT = Proposed Threatened under the ESA

This PBO describes the proposed action and the anticipated effects of the proposed action as implemented under the Action Agencies' programs that fund or carry out habitat restoration actions on all lands within the State of California. The purpose of this consultation is to provide statewide section 7 consultation coverage, for multiple federally-listed species under USFWS jurisdiction, for a range of proposed restoration actions funded by any one of the several restoration programs administered by the Action Agencies in California. These proposed restoration actions are described in the PBA. All NOAA RC, USACE or USFWS programs can utilize this PBO for restoration projects they fund, authorize, or carry out. Such USFWS programs include, but are not limited to, the Coastal Program, Partners for Wildlife Program (PFW), Fish and Aquatic Conservation Program, Refuges, and the Central Valley Joint Venture (CVJV). Please note there is a late arriving action agency process that is described in the PBA and later in this section of this PBO.

The intent of completing this programmatic restoration consultation for the entire state of California was to:

- promote regional consistency in design criteria for similar project types,
- provide consistency in the conservation measures to be implemented to minimize impacts to federally-listed species,
- ensure species-specific conservation measures are applied as needed to minimize impacts to federally-listed species,
- expedite regulatory review of restoration projects in California, specifically those addressing protection, enhancement, and restoration of aquatic habitat and ecological functions; and
- to develop a required reporting process in which any effects to federally-listed species are documented.

This reporting process will allow the USFWS to annually review implementation of this PBO and determine if the design criteria, and protection measures are adequate to protect listed species, and develop alternatives if any are found necessary.

This PBO is based on the following major sources of information: the 2022 PBA (USFWS 2022) and supporting reference information; the USFWS PROJECTS Biological Opinion on the Programmatic Restoration Opinion for Joint Ecosystem Conservation by the USFWS (USFWS 2015a); many internal discussions between USFWS restoration practitioners, consultation biologists, and species experts; many external discussions among the Action Agencies regarding project types, design criteria and protection measures; and information in our files, including Recovery Plans and Federal listings and critical habitat designations published in the Federal Register.

Some information in the Proposed Action (Section 2) is different than the information provided in the PBA and draft PBO. Most changes were to fix minor errors or provide clarity. All changes were reviewed and approved by the Action Agencies prior to this final version of the PBO.

Overview of the Proposed Action

The proposed action consists of ten categories of eligible aquatic and riparian restoration project types, along with associated design guidelines and appropriate protection measures. The restoration project types include:

1. Improvements to stream crossings and fish passage;
2. Removal of small dams, tide gates, flood gates, and legacy structures;
3. Bioengineered bank stabilization;
4. Restoration and enhancement of off-channel and side-channel habitat;
5. Water conservation projects for enhancement of fish and wildlife habitat;
6. Floodplain restoration;
7. Removal of pilings and other in-water structures;
8. Removal of nonnative terrestrial and aquatic invasive species and revegetation with native plants;
9. Establishment, restoration, and enhancement of tidal, subtidal, and freshwater wetlands (including vernal pools and managed wetlands); and
10. Establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites, including coastal dunes.

All proposed restoration projects must result in a net increase in aquatic or riparian resource functions and/or services and be consistent with USFWS Recovery Plans or recovery-related documentation for Covered Species.

Timeframe of Proposed Action

The Action Agencies' proposed action is valid for 10 years. The temporal scope of the PBO was limited since this is the first programmatic restoration consultation of this scale (throughout the State of California) and due to the novel approach of setting self-imposed take limits. When the 10-year period has passed, the Federal Action Agencies can request reinitiation of consultation to extend the term of the PBO. Such reinitiation may not necessarily require revisiting the entire PBO. We note that the proposed action includes annual reporting requirements in December by the project proponents and an annual coordination meeting in January among the Action Agencies. These annual reports and meetings will be used to identify if the PBO restoration projects meet the conservation intent of the Effort and whether reinitiation of consultation is needed.

Action Area

The 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). For this consultation, the overall program action area consists of the combined action areas for each eligible restoration project to be authorized, funded, or carried out under this PBO within the range of multiple listed species and their designated critical habitat in California. More specifically, this includes the following habitats that may be affected by site preparation, construction, and site restoration at each action site: riparian areas; rivers and streams; open

water areas including bays, lakes, ponds, and lagoons; wetlands including vernal pools, seasonal swales, seasonal wetlands, managed wetlands, and seeps; brackish, salt, and freshwater marshes; tidal lagoons; estuaries; floodplains and alluvial fans; desert washes, arroyos, mesas, terraces, mesic areas, coastal dunes and other similar habitats; and areas of eligible restoration projects that are adjacent to and would benefit these habitat types.

The Action Agencies annually fund, authorize, or carry out multiple restoration actions in the above-mentioned habitat types on all lands in the state of California. Thus, the Action Area for this consultation includes all lands in the state of California (see Figure 1).

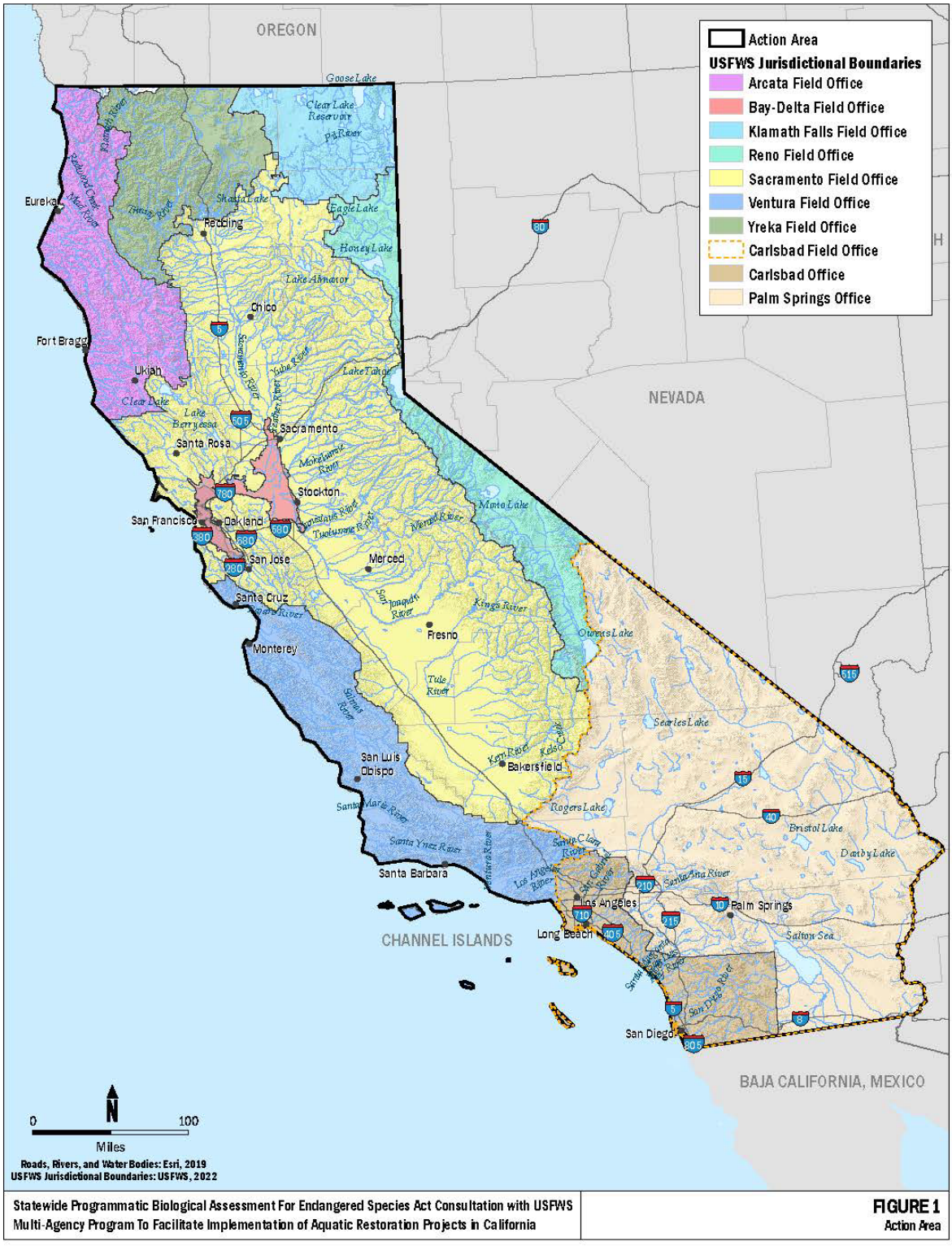
Requirements for Coverage (Eligibility Criteria)

All projects must meet the definition of a restoration project and be consistent with USFWS recovery plans or recovery-related documentation for Covered Species. A restoration project is defined as an eligible project type and relevant protection measures that will result in a net increase in aquatic, riparian, floodplain, wetland, or coastal dune resource functions and/or services through implementation of the eligible project types, relevant protection measures, and design guidelines. Not every restoration activity will benefit all affected species; at the same time, the goal for each restoration project will be to result in no net loss of waters of the United States and only discountable adverse effects to federally-listed species and their critical habitats through implementation of relevant protection measures and/or offsetting habitat restoration or enhancement as part of the project design and within the project footprint, when feasible. A restoration project covered by this consultation may include multiple benefits, such as habitat restoration, groundwater recharge, recreation, flood management, water quality improvement, and/or adaptation to climate change. In addition, some restoration projects may require creation, modification, or relocation of infrastructure so that travel, recreation, water supply, or other types of infrastructure and operations can continue in the context of the restored habitat (e.g., relocation of a bridge or water control structure to allow for habitat restoration).

The following activities are not within the scope of the PBO, and will require separate authorization:

1. Use of gabion baskets.
2. Use of cylindrical riprap (e.g., Aqualogs).
3. Construction of permanent dams or concrete-lined channels of any sort.
4. Use of chemically treated timbers used for grade or channel stabilization structures, bulkheads, or other instream structures.
5. Activities that substantially disrupt the movement of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the project areas.
6. Elimination of a riffle, pool, or riffle/pool complex that is not replaced/enhanced elsewhere by the project.

Figure 1: Map of California with USFWS Office Jurisdictional Boundaries



Statewide Programmatic Biological Assessment For Endangered Species Act Consultation with USFWS
Multi-Agency Program To Facilitate Implementation of Aquatic Restoration Projects in California

FIGURE 1
Action Area

7. New water diversions that would cause listed aquatic species stranding (i.e., those without controls that provide functional separation of the species from the project supported by the new diversion), except to temporarily dewater a project site (some water conservation projects are allowed under the Proposed Restoration Effort (Section 2.1.3.5, *Water Conservation Projects for Enhancement of Fish and Wildlife Habitat*) or for diversions associated with delivery or conveyance to and within managed wetlands as described in Section 2.1.3.9.
8. Installation of flashboard dams, head gates, or other mechanical structures that would cause listed aquatic species stranding are generally prohibited; however, there are exceptions for certain projects that require them to meet ecological goals (e.g., storage projects to reduce low flow stream diversions [Section 2.1.3.5, *Water Conservation Projects for Enhancement of Fish and Wildlife Habitat*], off-channel/side-channel, managed floodplain, and managed wetland habitat) and for the required replacement of legacy structures (Section 2.1.3.2 *Removal of Small Dams, Tide gates, Flood gates, and Legacy Structures*).
9. Creation or potential creation of a barrier to anadromous fish passage, as determined by the NMFS fish passage guidelines (including any associated maintenance activities, or lack thereof).
10. Use of excess riprap bank protection or hard armoring of banks, other than the minimum amount needed to achieve project goals, as determined by the Lead Action Agency in coordination with the USFWS Field Office.
11. Installation of infiltration galleries.
12. Managed surrogate floodplain and managed returned flows that do not allow for volitional movement (ingress and egress) of fish to the main channel (up and/or downstream).
13. Projects that would result in a net loss of aquatic resource functions and/or services.
14. Projects that would result in a net loss of vernal pool habitat.
15. Projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species.
16. Projects overlapping the current range of amphibians endemic to the Sierra Nevada (i.e., Sierra Nevada yellow legged frog, mountain yellow-legged frog (Northern California DPS, and Yosemite toad) that would extend the range of predatory fish (e.g., salmonids or centrarchids); because amphibians in the Sierra Nevada evolved mostly in the absence of predatory fish, the recovery of amphibians in the Sierra Nevada can be hindered by the presence of predatory fish.

Project category-specific design guidelines were developed to help Project Proponents design projects in a manner that is appropriate and sustainable; minimizes adverse effects to aquatic habitats; maximizes the ecological benefits to further support the recovery of Covered Species; and is consistent with multiple permitting agency regulatory practices. For example, these

guidelines include designing restored streams in ways that provide fish passage and withstand probable flooding events. Modified approaches to design that do not conform to the eligible project types may be proposed by the Project Proponent during technical assistance with the USFWS Field Office, based on site-specific conditions or technological constraints or advances. All projects covered under this consultation would also need to incorporate applicable protection measures into their project design to avoid and minimize effects to Covered Species.

Late Arriving Action Agency Process

In addition to the Action Agencies identified above and the multiple programs associated with these Action Agencies, this PBO may also provide section 7(a)(2) consultation coverage for federal agencies that are not a part of this programmatic consultation but later request to use the PBO for restoration actions they fund, oversee, or carry out. Such federal agencies are referred to as a "Late Arriving Action Agency." The Late Arriving Action Agency can choose to use the PBO or not. If they choose to use the PBO, they would need to ensure any restoration actions they propose to be covered by this PBO meet all the requirements of the PBO and coordinate with the USFWS to determine which of the following options are available:

1. If the USFWS Field Office concludes that no additional analysis, protection measures, or terms and conditions are necessary or appropriate, the USFWS Field Office could include the federal agency as a Late-Arriving Action Agency via formal correspondence indicating their participation in the Effort and potential to use the ESA Section 7(a)(2) Review Form process to potentially be covered by this PBO.
2. The USFWS Field Office could require the Late-Arriving Action Agency to initiate a new separate consultation with the USFWS Field Office, with some efficiencies potentially available by incorporating the PBO by reference in the new consultation, along with information specific to the Late-Arriving Action Agency and any new protection measures and terms and conditions.
3. The USFWS Field Office could recommend the use of other existing programmatic biological opinions or a combination of such biological opinions, if available and appropriate.
4. If additional analysis, incidental take, or terms and conditions are necessary or appropriate, the USFWS Field Office could reinitiate consultation to revise the PBO to accommodate the Late Arriving Action Agency. However, due to workload constraints, this option would not be the most efficient path.

To ensure compliance with the programmatic approach to restoration activities addressed in this PBO, an administrative process was developed that is described in the Project Description.

1.1. Consultation History

A summary of the meetings, correspondence, and discussions that took place between the participating agencies for the development of this statewide programmatic consultation is provided in this section. These collaborative efforts are listed in chronological order.

- On March 2, 2017, NOAA RC and the California nonprofit organization Sustainable Conservation sent a memorandum to Paul Souza, Regional Director, USFWS, requesting a meeting to discuss a proposal for statewide Section 7 consultation for select species, covering USACE permitting of aquatic habitat restoration in California.
- On May 4, 2017, a meeting was held at the USACE office in Sacramento between USFWS, NOAA RC, NMFS, State Water Board, and Sustainable Conservation. A proposal for programmatic ESA Section 7 consultation, along with programmatic Section 401 water quality certification and waste discharge requirements from the State Water Board for aquatic and riparian restoration statewide was presented; and staff capacity and timing were discussed. USFWS recommended Sustainable Conservation brief all USFWS Field Offices on the proposal, with the aim of gathering support and feedback prior to moving forward.
- On June 14, 2017, Sustainable Conservation conducted a conference call with staff from the USFWS Regional Office, Section 7 Division, Bay-Delta Fish and Wildlife Office, and Arcata Fish and Wildlife Office to brief them on the proposal for programmatic Section 7 coverage and to get their feedback and support to move forward.
- On July 25, 2017, Sustainable Conservation conducted a conference call with staff from the USFWS Regional Office, Ventura Fish and Wildlife Office, Carlsbad Fish and Wildlife Office, Palm Springs Fish and Wildlife Office, and Klamath Fish and Wildlife Office to brief them on the proposal for programmatic Section 7 coverage and to get their feedback and support to move forward.
- On August 8, 2017, Sustainable Conservation conducted a conference call with staff at the Yreka Fish and Wildlife Office to brief them on the proposal for programmatic Section 7 coverage and to get their feedback and support to move forward.
- On September 7, 2017, Michael Jewell, Chief, Regulatory Division, submitted a letter to Sustainable Conservation to confirm USACE's commitment to programmatic consultation for the USACE 404 permitting process for restoration projects.
- On October 10, 2017, Sustainable Conservation conducted a conference call with staff from the USFWS Regional Office, FAC, and Refuge to get their feedback and support to move forward.
- On January 24, 2018, Sustainable Conservation submitted a memorandum to USFWS, recommending that USFWS join USACE and NOAA RC as Action Agencies for the Section 7 consultation for statewide restoration projects. This recommendation was made because the USFWS FAC and Refuge offices need Section 7 consultation for restoration projects they regularly implement.
- On January 25, 2018, a conference call was held between NOAA RC, USACE, USFWS, and Sustainable Conservation to develop a strategy for a programmatic ESA Section 7 consultation for restoration statewide, similar to previous consultations for restoration in the coastal areas and Central Valley of California with NMFS; to

discuss inclusion of USFWS as an Action Agency; and to discuss developing one statewide PBO or several PBOs that would collectively cover the state of California.

- On March 26, 2018, a conference call was held between USFWS Regional Office staff and Sustainable Conservation to discuss roles and responsibilities of USFWS and Sustainable Conservation, and to discuss USFWS joining as an Action Agency.
- On March 28, 2018, USFWS submitted a letter to Sustainable Conservation to confirm USFWS's commitment to this programmatic consultation.
- On April 9, 2018, a conference call was held between NOAA RC, USACE, USFWS, and Sustainable Conservation to discuss questions regarding a memorandum outlining the programmatic consultation's framework and direction (e.g., draft project type descriptions and design guidelines).
- On May 24, 2018, Sustainable Conservation sent a draft of the Program Description to the FOs for review and comment.
- On June 13, 2018, a conference call was held between USFWS Ventura Fish and Wildlife Office, the USACE Los Angeles District, and Sustainable Conservation to brief the USACE Los Angeles District on the proposed programmatic ESA Section 7 consultation for the statewide restoration effort.
- On June 24, 2018, a conference call was held between the following USFWS Field Offices: Arcata, Bay-Delta, Carlsbad, Sacramento, Ventura , and FAC, Regional staff, and Sustainable Conservation to discuss the overall Statewide Multi-Agency Effort, participant roles, comments on the programmatic consultation's framework and direction, and PBA development process.
- July 19, 2018, USFWS sent an email to Sustainable Conservation with comments on the Draft Program Description from Donald Ratcliff on behalf of FAC and Refuges.
- On July 24, 2018, a conference call was held between the following USFWS Field Offices: Arcata, Bay-Delta, Carlsbad, Sacramento, Ventura, and FAC, Regional staff, and Sustainable Conservation to discuss the overall Statewide Multi-Agency Program, participant roles, comments on the programmatic consultation's framework and direction, and PBA development process. FWS staff noted the things that would need to be considered in a programmatic consultation to make it feasible to analyze potential effects. Project description and species coverage considerations were discussed.
- On July 24, 2018, FWS RO also sent comments via email from the Yreka Fish and Wildlife Office on the Draft Program Description to Sustainable Conservation.
- On November 19, 2018, Sustainable Conservation sent the contact information for the Army Corp's (USACE) Project Development Team assigned to work on the statewide initiative to the FWS ARD.
- On December 6, 2018, a draft programmatic consultation framework, timeline, and technical memorandum, including listed animal and plant species proposed for inclusion in the PBA (file dated December 5, 2018), was sent via email to FWS, NOAA RC, and the Corps for review and comment prior to drafting the PBA.

- On December 6, 2018, the FWS RO provided a draft Programmatics Process Paper to Sustainable Conservation.
- On January 11, 2019, a technical memorandum on general protection measures (GPMs), design guidelines, and project-type specific protection measures was sent to USFWS, NOAA RC, and USACE via email for review and comment prior to drafting the PBA.
- On March 1, 2019, a conference call was held with USFWS, NOAA RC, USACE, Sustainable Conservation, and biological consulting firm AECOM Technical Services, Inc. (AECOM) (hired by Sustainable Conservation) to discuss staff comments on the draft programmatic consultation framework, timeline, and technical memorandum, including listed animal and plant species proposed for inclusion in the PBA.
- On January 11, 2019, a technical memorandum on GPMs, design guidelines, and project-type specific protection measures was sent to FWS, NOAA RC, and the Corps via email for review and comment prior to drafting the PBA.
- On January 28, 2019, the FWS RO shared with Sustainable Conservation that Field Office Project Leaders were evaluating workload and timetables after the shutdown and furloughs.
- On March 1, 2019, a conference call was held with FWS, NOAA RC, the Corps, Sustainable Conservation, and biological consulting firm AECOM (hired by Sustainable Conservation) to discuss staff comments on the draft programmatic consultation framework, timeline, and technical memorandum, including listed animal and plant species proposed for inclusion in the PBA.
- On March 12, 2019, a technical memorandum on species protection measures was sent to USFWS, NOAA RC, and USACE via email for review and comment prior to drafting the PBA.
- April 15, 2019, FAC/Refuges sent an email to Sustainable Conservation summarizing items for discussion.
- May 1, 2019, Sustainable Conservation sent the FWS RO a draft flow chart for the administrative process for implementation of the proposed PBO.
- On May 5, 2019, a conference call was held between USFWS Regional Office staff and Sustainable Conservation to discuss the PBA development process and administrative process.
- On May 28, 2019, Sustainable Conservation sent the USFWS Regional Office, via email, revised GPMs and programmatic consultation framework for Field Office consideration during their review of species protection measures.
- On July 29, 2019, the FWS RO sent Sustainable Conservation compiled agency comments on the administrative process.
- On July 30, 2019, representatives from the USFWS Regional and Field offices, NOAA RC, USACE, Sustainable Conservation, and AECOM met to discuss details of the administrative process and the potential extent of biological assessment coverage.

- On August 27, 2019, representatives from USFWS Regional Office, Sacramento Fish and Wildlife Office, Sustainable Conservation, and AECOM met to discuss certain steps of the administrative process and details of the species protection measures.
- On September 24, 2019, an administrative draft PBA was sent to USFWS, NOAA RC, and USACE via email for review and comment.
- Between September 24 and mid-October 2019, FOs provided comments on an electronically shared version of the PBA.
- On December 19, 2019, representatives from USFWS Regional and Field offices, NOAA RC, USACE, Sustainable Conservation, and AECOM met to discuss comments on the administrative draft PBA.
- On February 20, 2020, representatives from CDFW, Sustainable Conservation, and AECOM met to discuss an opportunity for CDFW to provide input on dually listed and species of special concern protection measures in the PBA, to support the development of coordinated protection measures between CDFW and USFWS. CDFW had already reviewed project type descriptions as part of coordination on the Statewide Multi-Agency Effort.
- From March 2020 through May 2020 Sustainable Conservation met with USFWS, USACE, and NOAA RC to discuss and get agreement among the Action Agencies on the review of draft species protection measures and relevant GPMs by restoration Project Proponents (e.g., NGOs, government agencies, etc.). The purpose of this review was to get feedback on the ability to implement species protection measures.
- From June through October 2020 Sustainable Conservation conducted outreach to restoration Project Proponents with species-specific expertise to get feedback on the ability to implement protection measures.
- In November 2020, Sustainable Conservation and the NOAA RC, USACE, and USFWS had meetings to present the Administrative Draft #2 PBA for their review.
- On November 12, 2020, Sustainable Conservation provided a revised PBA and a memo in response to the FOs request for additional information on the Program Description. On November 16, 2020, a corrected version was sent.
- On December 18, 2020, the FWS RO sent Sustainable Conservation a summary of initial feedback from the Field Offices who had been able to look at the document.
- On December 24, 2020, Sustainable Conservation sent a Draft PBA-PBO timeline for FWS Regional Director.
- On January 12, 2021, Sustainable Conservation submitted a memo to the USFWS that included a summary of the existing sideboards in the PBA and proposed additional sideboards/program limits.
- From January through March 2021, Sustainable Conservation and USFWS met to discuss progress on review of the PBA.
- On June 22, 2021, representatives from USFWS Regional Office, NOAA RC, and USACE met to discuss the PBA administrative process.

- On November 17, 2021, representatives from USFWS Regional Office, NOAA RC, USACE, and Sustainable Conservation met to discuss program need estimates, other outstanding questions, and next steps.
- On February 16, 2022, representatives from USFWS Regional Office, NOAA RC, USACE, and Sustainable Conservation met to discuss limits, meeting schedule, and timeline.
- From February 17, 2022 – May 2022 representatives from USFWS Regional Office, NOAA RC, and Sustainable Conservation met one to two times a month to discuss the remaining species conservation measures and limits. USACE was updated regularly through electronic mail.
- On June 6, 2022, the Action Agencies had no more comments on the Draft PBA and accepted the document production support provided by Sustainable Conservation.
- On June 9, 2022, Sustainable Conservation delivered a final version of the PBA, that incorporated all Action Agency comments, to USFWS, USACE and NOAA RC.
- On June 13, 2022, NOAA RC provided a letter to the USFWS adopting the June 2022 Programmatic Biological Assessment for the Statewide Multi-Agency Effort and designating the USFWS as the lead federal agency to act on their behalf for purposes of consultation under Section 7 of the ESA.
- On June 14, 2022, USACE provided a letter to the USFWS adopting the June 2022 Programmatic Biological Assessment for the Statewide Multi-Agency Effort and designating the USFWS as the lead federal agency to act on the behalf of the USACE Sacramento, Los Angeles and San Francisco Districts for purposes of consultation under Section 7 of the ESA.
- On June 14, 2022, USFWS FAC requested initiation of formal consultation to USFWS ES on the Statewide Restoration Effort.
- On July 1, 2022, USFWS ES provided a draft PBO to the Action Agencies and USFWS Field Offices for review.
- On July 11, 2022, NOAA-RC informed the USFWS they had no comments on the draft PBO.
- On July 12 and 13, 2022, USACE provided comments on the draft PBO via email.
- On July 12, 2022, Field Offices and USFWS Programs completed their review of the draft PBO.
- On July 19, 2022, the RO provided an underline strikeout version of the PBO to the Action Agencies via email.
- On August 12, 2022 the RO completed addressing the comments on the draft PBO.

1.2. Concurrences on other Listed Species

The Action Agencies requested concurrence for their not likely to adversely affect (NLAA) determinations for the species and critical habitat identified in Table 2 below resulting in informal consultation.

Table 2: Species and Critical Habitat with a Not Likely to Adversely Affect Determination

Species Common Name	**Species Latin Name**	**ESA Status**	**Critical Habitat**
Howell's spineflower	*Chorizanthe howellii*	E	N/A
palmate-bracted bird's-beak	*Cordylanthus palmatus*	E	N/A
pedate checker-mallow	*Sidalcea pedata*	E	N/A
San Bernardino Merriam's kangaroo rat (Species only)	*Dipodomys merriami parvus*	E	See Table 1
Santa Ana River woolly-star	*Eriastrum densifolium* ssp. *sanctorum*	E	N/A
slender-horned spineflower	*Dodecahema leptoceras*	E	N/A
soft bird's-beak	*Cordylanthus mollis* spp. *Mollis*	E	Yes
Sonoma alopecurus	*Alopecurus aequalis* var. *sonomensis*	E	N/A
Southwestern willow flycatcher	*Empidonax traillii extimus*	E	Yes
Suisun thistle	*Cirsium hydrophilum* var. *hydrophilum*	E	Yes
yellow-billed cuckoo - Western DPS	*Coccyzus americanus*	T	Yes

We considered this request for our concurrence that the proposed action may affect but is not likely to adversely affect the above listed species and designated critical habitats. We agree that effects to the species and critical habitat, identified in Table 2, from the implementation of the proposed action, including the associated eligibility criteria, prohibited acts, and conservation measures are either: (1) discountable because they are unlikely to occur; or (2) insignificant because the scale and extent of the negative effects will not result in take of a listed animal or reduction in the value of critical habitats through impacts to physical and biological features[1] (PBFs). Thus, we concur with their determination that implementation of the PBA is not likely to adversely affect the listed species and designated critical habitat identified in Table 2. Our concurrence is based on the information for each species provided in Appendix D and summarized below:

- The goals of the Action Agencies' programs addressed in the PBA are to restore native habitats to benefit native fish, wildlife, and plant species, including federally-listed species.

- By following the conservation measures, short-term impacts to habitats (including designated and proposed critical habitats that support the above federally-listed

[1] The current critical habitat regulations (81 FR 7214) replace the term primary constituent elements with physical and biological features. This shift in terminology does not change the approach used in conducting our analysis. We will use PBFs and PCEs interchangeably in this document.

species) are limited to those that are insignificant, discountable, or wholly beneficial. Long-term adverse effects to these habitats are not anticipated.

- By following the species-specific conservation measures, the proposed action is not likely to result in harm or harassment to the species and critical habitat identified in Table 2 during their critical reproduction, rearing, and growth periods.

- By consulting with the appropriate USFWS Field Office for each project through the ESA Section 7(a)(2) Review Form process, each restoration project will incorporate the best appropriate conservation measures to protect listed species at a project site.

- No applicable PBFs in designated critical habitat for species above will be adversely affected by the proposed action across the range of any species. The GPMs and species-specific conservation measures have been designed to substantially minimize or eliminate the amount and severity of potential effects to the physical and biological habitat components represented by PBF's of critical habitat for the above-mentioned species. The GPMs and proposed restoration project categories will minimize or eliminate potential negative effects to such an extent that these effects will be insignificant or discountable, and, in the long-term, improve proper functioning conditions in riparian, wetland, estuarine, stream, and upland habitats necessary to support the species listed above. In addition, the ESA Section 7(a)(2) Review Form, Post Construction Report Form, and annual meeting among the Action Agencies, provides a process to ensure the restrictions/measures in the PBA for which we based our NLAA determination, are followed.

Any restoration action that is likely to adversely affect the above species or their critical habitat is not covered by this PBO and must go through an individual section 7 consultation.

2. Proposed Action

This section of the PBO is based on information in the June 2022 PBA. The proposed programmatic action (Proposed Restoration Effort) includes categories of eligible restoration project types, design guidelines, and appropriate protection measures. The restoration project types are listed in Table 3 below.

Table 3: Eligible Project Types

Eligible Project Types	**Description**
Improvements to stream crossings and fish passage	Projects to address upstream and downstream movement by fish and other species, and to improve functions of streams
Removal of small dams, tide gates, flood gates, and legacy structures	Projects to improve fish and wildlife migration, tidal and freshwater circulation and flow, and water quality
Bioengineered bank stabilization	Projects to reduce fine sediment input, enhance aquatic and riparian habitat, and improve water quality
Restoration and enhancement of off-channel and side-channel habitat	Projects to improve aquatic and riparian habitat for fish and wildlife

Water conservation projects for enhancement of fish and wildlife habitat	Projects such as off-stream storage tanks and ponds, and including necessary off-channel infrastructure, to reduce low-flow stream diversions
Floodplain restoration	Projects including levee, berm, and dike setback; breaching and removal; and hydraulic reconnection and revegetation to improve ecosystem function through hydrological connection between streams and floodplains
Removal of pilings and other in-water structures	Projects to improve water quality and aquatic habitat for fish and wildlife
Removal of nonnative terrestrial and aquatic invasive species and revegetation with native plants	Projects to improve aquatic and riparian habitat for fish and wildlife and improve other watershed functions
Establishment, restoration, and enhancement of tidal, subtidal, and freshwater wetlands	Projects to restore and improve ecological functions and services of tidal, subtidal, and freshwater wetlands, including actions to benefit vernal pools and managed wetlands
Establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites	Projects to restore and improve ecological functions and services of streams and riparian areas

2.1.1. Prohibited Activities

The following activities are not within the scope of the Proposed Restoration Effort, are not analyzed in this PBO, and will require separate consultation:

1. Use of gabion baskets.
2. Use of cylindrical riprap (e.g., Aqualogs).
3. Construction of permanent dams or concrete-lined channels of any sort.
4. Use of chemically treated timbers used for grade or channel stabilization structures, bulkheads, or other instream structures.
5. Activities that substantially disrupt the movement of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the project areas.
6. Elimination of a riffle, pool, or riffle/pool complex that is not replaced/enhanced elsewhere by the project.
7. New water diversions that would cause listed aquatic species stranding (i.e., those without controls that provide functional separation of the species from the project supported by the new diversion), except to temporarily dewater a project site (some water conservation projects are allowed under the Proposed Restoration Effort [Section 2.1.3.5, *Water Conservation Projects for Enhancement of Fish and Wildlife Habitat])* or for diversions associated with delivery or conveyance to and within managed wetlands as described in Section 2.1.3.9.
8. Installation of flashboard dams, head gates, or other mechanical structures that would cause listed aquatic species stranding are generally prohibited; however, there are exceptions for certain projects that require them to meet ecological goals (e.g., storage projects to reduce low flow stream diversions [Section 2.1.3.5, *Water Conservation*

Projects for Enhancement of Fish and Wildlife Habitat], off-channel/side-channel, managed floodplain, and managed wetland habitat) and for the required replacement of legacy structures (Section 4.3.2 *Removal of Small Dams, Tide gates, Flood gates, and Legacy Structures*).

9. Creation or potential creation of a barrier to anadromous fish passage, as determined by the NMFS fish passage guidelines (including any associated maintenance activities, or lack thereof).
10. Use of excess riprap bank protection or hard armoring of banks, other than the minimum amount needed to achieve project goals, as determined by the Lead Action Agency in coordination with the USFWS Field Office.
11. Installation of infiltration galleries.
12. Managed surrogate floodplain and managed returned flows that do not allow for volitional movement (ingress and egress) of fish to the main channel (up and/or downstream).
13. Projects that would result in a net loss of aquatic resource functions and/or services.
14. Projects that would result in a net loss of vernal pool habitat.
15. Projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species.
16. Projects overlapping the current range of amphibians endemic to the Sierra Nevada (i.e., Sierra Nevada yellow legged frog, mountain yellow-legged frog (Northern California DPS), and Yosemite toad) that would extend the range of predatory fish (e.g., salmonids or centrarchids); because amphibians in the Sierra Nevada evolved mostly in the absence of predatory fish, the recovery of amphibians in the Sierra Nevada can be hindered by the presence of predatory fish.

2.1.2. Administration of the PBO

This is a large programmatic opinion covering numerous species and actions throughout the State of California. Thus, a process for administering the PBO was developed.

2.1.2.1. Determining Lead Action Agency

The Project Proponent will initiate this process by contacting USACE, NOAA RC, and/or the USFWS (Action Agencies) for Clean Water Act or Rivers and Harbors Act permitting and/or project funding. The Federal Action Agencies will coordinate to evaluate project eligibility under this Effort and to determine the role of Lead Action Agency for the proposed restoration project.

The Lead Action Agency will vary depending on a project's permitting and funding. If the USFWS provides funding through one of its programs, such as the USFWS FAC, Refuge, Coastal, CVJV, or Partners programs, USFWS will likely be the Lead Action Agency. If a project is in a USFWS Refuge, USFWS will be the Lead Action Agency. If NOAA RC provides

funding through one of its programs such as the Community-Based Restoration Program or NOAA's DARRP, then NOAA RC will likely be the Lead Action Agency. USACE may serve as the Lead Action Agency if the project requires Clean Water Act Section 404 and/or Rivers and Harbors Act Section 10 and/or 408 authorization.

2.1.2.2. Initial Project Screening for Programmatic

Although this is a statewide consultation, there are other existing authorizations (e.g., habitat conservation plans [HCPs], regional biological opinions, programmatic biological opinions) for restoration projects. The Lead Action Agency and the USFWS Field Office will work together to identify the consultation options for the proposed project. A determination whether this PBO is the most appropriate consultation, over other existing authorizations, will be made by the USFWS Field Office based on the potential effects to Covered Species.

In coordination with the Lead Action Agency for the Proposed Restoration Project, the Project Proponent will initiate Technical Assistance with the appropriate USFWS Field Office or Section 7 delegated authority (FAC, Refuge, Coastal, CVJV), as necessary, to discuss project-specific needs and/or discuss the applicable protection measures. Technical Assistance may include a variety of coordination steps, such as discussions with the Project Proponent; coordination with the Lead Action Agencies and the USFWS Field Office; and a field visit to the project site, if necessary. If a field visit is needed to determine whether a Proposed Restoration Project is eligible for the Proposed Restoration Effort, the Project Proponent and the Lead Action Agency will coordinate a field visit.

2.1.2.3. Submittal Requirements

The Project Proponent is responsible for compiling all the necessary information and preparing a complete ESA Section 7(a)(2) Review Form package (Appendix A) for its proposed restoration project. The ESA Section 7(a)(2) Review Form includes prompts to provide the information necessary for the USFWS to conduct a thorough review of the project, understand the estimated impacts to Covered Species and critical habitat, as applicable, and ensure the project meets the appropriate criteria to be appended to the PBO. The local USFWS Field Office is available to provide technical assistance prior to submittal of the ESA Section 7(a)(2) Review Form. The ESA Section 7(a)(2) Review Form includes, but is not limited to, the following:

- General Information: Project name, Project Proponent, Lead Action Agency, IPaC generated species list and the number generated from that list, etc.
- Project Information: Proposed start and end dates, project types, maps, etc.
- Project Description: Objectives, description of activities, figures, etc.
- Environmental Information: Site conditions, concise summary of effects to Covered Species and critical habitat, biological monitoring, conservation measures, etc.

Proposed restoration projects that deviate from the eligible project types (Section 2.1.3 *Eligible Project Types and Design Guidelines*) and prohibited activities (Section 2.1.1 *Prohibited Activities*) will likely require an individual Section 7 consultation or other means of ESA compliance. Modified protection measures may be proposed by the Project Proponent, based on site-specific conditions or technological constraints or advances. Modified measures must still meet the intent of the protection measures in the Proposed Restoration Effort and can be discussed during technical assistance with the USFWS Field Office for inclusion in the ESA Section 7(a)(2) Review Form.

2.1.2.4. ESA Compliance for Proposed Restoration Projects

USFWS Programs (e.g., FAC, Refuge, Coastal, CVJV) have delegated authority to conduct Section 7 consultation. As a result, these USFWS Programs will use the ESA 7(a)(2) Review Form to cover projects by the PBO and serve the role of the USFWS Field Office for their respective projects. Thus, throughout the PBO when where the term "USFWS Field Office" is used, it is meant to be inclusive of USFWS Programs with delegated authority. In such cases, the USFWS Program will manage the compliance process identical to the process used by USFWS Field Offices.

For NOAA RC, USACE and the Late Arriving Action Agencies, they will receive an ESA Section 7(a)(2) Review Form from a Project Proponent. In such cases, the applicable Lead Action Agency (NOAA RC, USACE, or Late Arriving Action Agency) will conduct the following steps:

1. Review the ESA Section 7(a)(2) Review Form for completeness[2], as prepared by the Project Proponent.
2. If the ESA Section 7(a)(2) Review Form is complete, submit the ESA Section 7(a)(2) Review Form to the respective USFWS Field Office and request concurrence that the project is applicable and can be appended to the PBO for compliance with Section 7 of the ESA.
3. Notify the Project Proponent that their ESA Section 7(a)(2) Review Form is complete or incomplete; in cases where the ESA Section 7(a)(2) Review Form is incomplete, the Lead Action Agency will notify the Project Proponent of the additional information needed.

The Lead Action Agency is responsible for ESA compliance, and for coordination with the Project Proponent and the USFWS Field Office on any proposed modifications to the project or protection measures.

The goal is that within 30 calendar days (and in no more than 60 days) of receiving a complete ESA Section 7(a)(2) Review Form, the Lead Action Agency will: (1) review the Form for completeness[1]; (2) if the Form is complete, submit the Form to the USFWS Field Office to

[2] USACE cannot initiate review of the ESA Section 7(a)(2) Review Form until USACE determines that the Project Proponent's application/Pre-construction Notification for a Department of the Army permit is complete.

request concurrence of coverage under the PBO, and (3) notify the Project Proponent if their Form is complete or incomplete. Response times will depend on the nature of the project and the amount of coordination that has occurred prior to submitting the ESA Section 7(a)(2) Review Form.

If the proposed project needs no further modifications, the USFWS Field Office will electronically sign the ESA Section 7(a)(2) Review Form to confirm compliance with the proposed project to the PBO and return the signed Form via email to the applicable Lead Action Agency to complete consultation under Section 7 of the ESA.

If additional information or project modifications are needed, the USFWS Field Office will contact the Lead Action Agency to coordinate with the Project Proponent. It is expected that sometimes an existing consultation/authorization, rather than the PBO associated with the PBA, may be the mechanism for the Proposed Restoration Project. In addition, as stated previously, it is expected that the PBO may not be applicable for some proposed restoration projects. The respective USFWS Field Office/Delegated Authority will make the final determination. The Lead Action Agency (NOAA RC, USACE, or USFWS) will notify the Project Proponent accordingly.

Signature of the ESA Section 7(a)(2) Review Form is required for a project to be appended to the PBO. Signature can be provided via electronic letter/memorandum with the associated ESA Section 7(a)(2) Review Form attached.

2.1.2.5. Project Implementation

With authorization from USFWS and after all required local, state, and federal permits have been obtained, the Project Proponent would implement their project, including the required applicable protection measures included in the ESA Section 7(a)(2) Review Form.

For those proposed restoration projects that may result in take of any species protected by the state of California or impacts to aquatic or riparian areas, the Project Proponent may also need to obtain CDFW permits or other approvals. CDFW staff reviewed the protection measures, and this PBO incorporates CDFW's comments. CDFW also reviewed project type descriptions as part of the coordinated effort to develop a statewide programmatic permit for restoration with the State Water Board. This coordination effort with CDFW was intended to make state permitting more efficient through the potential use of the PBO's protection measures in CDFW's restoration permits or via California Endangered Species Act consistency determinations.

For those proposed restoration projects that may result in adverse effects to migratory birds or eagles, the Project Proponent will need to contact the USFWS Migratory Bird Program.

2.1.2.6. Project Monitoring, Tracking and Reporting

Project Proponents are responsible for conducting all applicable project monitoring and reporting requirements prior to, during, and after project construction (e.g., revegetation monitoring, species rescue, and relocation reporting). Project Proponents must submit to the applicable

USFWS Field Office and Lead Action Agency their project specific Post-Construction Report Form (Appendix B).

Tracking Incidental Take

Project Proponents will use the ESA Section 7(a)(2) Review Form to document metrics needed to calculate estimated incidental take, so that the USFWS Field Office can identify the incidental take expected from the project and enter that estimate into a USFWS maintained internal tracking tool. This tool will be developed and managed by the USFWS Pacific Southwest Regional Office ES Program with Field Offices (or other USFWS Programs with delegated authority) responsible for data entry. If a USFWS Field Office receives a project request that would cause the annual incidental take limits to be exceeded, that Field Office would check in with active restoration projects to see if their actual take was lower than estimated, prior to considering approval of the project. If the take limit has been reached, the project needing take coverage for the species whose take limit has been reached will need to wait until the following calendar year to move forward under the PBO. The Project Proponent will report all injury or mortality of listed species to the USFWS Field Office within 48 hours. The Post-Construction Report Form will be used to document actual incidental take from the project.

Post-Construction Reporting

Project Proponents will provide the information requested in the Post-Construction Report Form provided in Appendix B to the respective USFWS Field Office (and copy the Action Agency) by December 1. If there are ongoing revegetation or species monitoring beyond the report due date, a report will be provided annually on December 1 until success criteria have been met or monitoring has ceased. Per GPM: Vegetation/Habitat Disturbance and Revegetation (VHDR-5), Revegetation Monitoring and Reporting, the standard for revegetation success is 60 percent (%) absolute cover compared to pre-project conditions at the project site or at least 60% cover compared to an intact, local reference site. If an appropriate reference site or pre-project conditions cannot be identified, success criteria will be developed for review and approval on a project-by-project basis, based on the specific habitat impacted and known recovery times for that habitat and geography.

Annual Action Agency Meeting

All Action Agencies using the PBO will meet annually in January to discuss implementation, cumulative impacts, and identify any need for changes to the PBO and process. USFWS Pacific Southwest Regional Office ES Program will be responsible for scheduling and hosting the meeting. The meeting will include all Action Agencies (including other USFWS program areas) and USFWS Field Offices that have utilized this PBO. This annual meeting will be an opportunity to ensure the effort is working as intended and address any implementation issues.

2.1.2.7. Timeline for Project Reviews

The Lead Action Agency will review the ESA Section 7(a)(2) Review Form to determine completeness and submit the ESA Section 7(a)(2) Review Form to USFWS Field Office for concurrence. The goal is to submit the ESA Section 7(a)(2) ESA Review Form to the USFWS Field Office within 30 days of receiving a complete form. After receiving a complete ESA Section 7(a)(2) Review Form, the USFWS Field Office will respond within 60 calendar days of receipt (but the goal is to respond within 30 days) regarding whether the USFWS Field Office concurs with the determination to cover the proposed project by the PBO. This assumes that any questions or issues would have been addressed in the early phases of this process through technical assistance (Figure 2).

2.1.2.8. Incidental Take

The intent of the PBA was to provide the necessary information, sideboards, conservation measures, and processes at a programmatic statewide scale to ensure their actions do not jeopardize the continued existence of any Covered Species or result in the destruction or adverse modification of critical habitat. For those species that may be adversely affected by the actions within the PBA, the Action Agencies proactively set self-imposed incidental take limits.

The self-imposed incidental take limit for each covered animal species with an LAA determination provides a limit that will not be exceeded on an annual basis under the Effort. Project Proponents will work with the respective USFWS Field Office during the ESA Section 7(a)(2) Review Form process to minimize take at the project level and avoid disproportionately affecting local populations. In some cases, proposed restoration projects may require independent consultation instead of programmatic coverage due to local effects being too great or if the project does not meet the intent of the Proposed Restoration Effort.

Once an individual take limit is reached, the Proposed Restoration Effort programmatic consultation is no longer available for proposed restoration projects that are expected to result in additional take of that individual species. However, the programmatic consultation will remain available for proposed restoration projects that do not need coverage for that particular species where the take limit was reached.

The specific self-imposed take limits are described within the section titled “Protection Measures” below.

Figure 2: Administration Flow Chart

June 2022

Figure 2 – Program Administration for ESA Section 7 Compliance with USFWS

Step 1

Project Proponent contacts Corps, NOAA RC, and/or USFWS (Action Agencies) for CWA or RHA permitting and/or project funding

Step 2

Action Agencies coordinate to evaluate project eligibility for the Program and to determine the Lead Agency for ESA Section 7 compliance:

- If Project Proponent has applied for a CWA Section 404 or RHA Section 408 permit to the Corps, Corps will typically be the Lead; or
- If NOAA RC provides funding, it will typically be the Lead; or
- If USFWS provides funding, it will typically be the Lead; or
- If the project is on USFWS property, USFWS will be the Lead ; or
- If a federal agency that is not a part of this programmatic consultation (i.e., Late-Arriving Action Agency) is funding, overseeing, or carrying out a qualifying project, then they will typically be the Lead

Step 3

- Obtain an Official Species List from the USFWS Information for Planning and Consultation (IPaC) online tool to identify the listed species of interest and evaluate their potential to occur on-site (https://ipac.ecosphere.fws.gov/)
- Determine General Protection Measures and Species Protection Measures that are applicable based on the project type, site specific constraints, project location, and species with potential to occur onsite
- In coordination with the Lead Agency, Project Proponent initiates Technical Assistance[1] with appropriate USFWS Ecological Services (ES) Field Office[2], as necessary, to discuss project-specific needs and/or identify the applicable Protection Measures
- Prepare and submit ESA Section 7(a)(2) Review Form to Lead Agency[3]

If ESA Section 7(a)(2) Review Form is incomplete, Lead Agency will notify Project Proponent where additional information is needed

Step 4

- The goal is that within 30 calendar days of receiving the Form, and in no more than 60 days, the Lead Agency will (1) review the Form for completeness, (2) if the Form is complete, submit the Form to USFWS ES to request concurrence of coverage under the Programmatic Biological Opinion (PBO), and (3) notify the Project Proponent if their Form is complete or incomplete.[4,5]
- The goal is that within 30 calendar days of receiving the Lead Agency's request, and in no more than 60 days, USFWS ES will respond to the Lead Agency and the Lead Agency will notify the Project Proponent in writing via email about their project's coverage under the PBO.[4,5]

Step 5

Project Proponent implements the project as described on the approved ESA Section 7(a)(2) Review Form.

- Report all injury or mortality of listed species to USFWS ES within 48 hours.
- Submit the Post-Construction Report Form to USFWS ES (and copy the Action Agency) by December 1st. If there is ongoing revegetation or species monitoring beyond the report due date, provide a report annually on December 1st until success criteria have been met, or monitoring has ceased.[6]

Step 6

All Action Agencies utilizing the PBO will meet annually in January to discuss implementation, cumulative impacts, and identify any need for changes to the program and process.

ACRONYMS

Corps	United States Army Corps of Engineers
CWA	Clean Water Act
ES	Ecological Services Program
ESA	Endangered Species Act
IPaC	Information for Planning and Consultation
NOAA RC	National Oceanic and Atmospheric Administration Restoration Center
PBO	Programmatic Biological Opinion
RHA	Rivers and Harbors Act
USFWS	United States Fish and Wildlife Service

LEGEND

- Action to be completed by Project Proponent
- Action to be completed by Action Agencies

1. Technical Assistance may include a variety of coordination steps, such as discussions with the Project Proponent, coordination with the Action Agencies and USFWS ES, a field visit to the project site.
2. The appropriate USFWS ES Field Office is based on the location of the Proposed Project. See Figure 1.
3. Ideally, the Project Proponent will submit the completed ESA Section 7(a)(2) Review Form and the Clean Water Act permit application concurrently. USFWS Programs have delegated Section 7(a)(2) authority and will serve the role of USFWS ES for their respective projects.
4. Project Proponent may not implement their project until all applicable federal, state, and local permits are obtained.
5. Written concurrence (i.e., electronically signed ESA Section 7(a)(2) Review Form package) via email from USFWS ES is required for the project to be covered under the PBO. Response times will depend upon the nature of the project and the amount of coordination that has occurred prior to submitting the ESA Section 7(a)(2) Review Form.
6. All revegetated areas will be maintained and monitored for a minimum of 2 years after replanting is complete, or until success criteria are met, to ensure that the revegetation effort is successful. The standard for success is 60% cover compared to pre-project conditions at the project site or at least 60% cover compared to an intact, local reference site. If an appropriate reference site or pre-project conditions cannot be identified, success criteria will be developed for review and approval on a project-by-project basis, based on the specific habitat impacted and known recovery times for that habitat and geography.

2.1.3. Eligible Project Types and Design Guidelines

This Proposed Restoration Effort describes categories of aquatic or riparian restoration projects occurring in California. Detailed descriptions of the restoration project types included in the Proposed Restoration Effort are provided in the sections that follow. For each project type, there is a brief summary of the project purpose, a description of different activities and/or subproject types, and a summary of typical associated construction activities. A more detailed description of typical construction activities/methods is provided in Section 2.1.4, *Typical Construction Activities and Methods*. Proposed restoration projects would include applicable protection measures determined during project planning and design.

Restoration project activities are described at the programmatic level because specific project site locations and other details are currently unknown. However, project category-specific design guidelines are provided below to help Project Proponents design proposed restoration projects in a manner that is appropriate and sustainable; minimizes adverse effects to aquatic habitats; maximizes the ecological benefits to further support the recovery of Covered Species; and is consistent with multiple permitting agency regulatory practices. For example, these guidelines include designing restored streams in ways that provide fish passage and withstand probable flooding events. Modified approaches to design that do not conform to the eligible project types listed below may be proposed by the Project Proponent during technical assistance with the USFWS Field Office (Figure 2), based on site-specific conditions or technological constraints or advances. All restoration projects covered under this consultation would also need to incorporate applicable Protection Measures into their project design to avoid and minimize effects to Covered Species.

2.1.3.1. Improvements to Stream Crossings and Fish Passage

Improvements to stream crossings and fish passage (including fish screens) provide a number of ecological benefits. For example, they provide safe passage for migratory and nonmigratory species, beneficial transport of sediment and debris, and improved hydrology and hydraulics. Stream crossing and fish passage improvements must be consistent with NMFS and CDFW fish passage criteria.

Stream Crossings, Culverts, and Bridges

Stream crossing, culvert, and bridge projects generally involve removing, replacing, modifying, retrofitting, installing, or resetting existing culverts, fords, bridges and other stream crossings and water control structures. This includes projects that are developed to upgrade undersized, deteriorated, or misaligned culverts.

Constructing or installing a stream crossing, culvert, or bridge may include site excavation, formation, and pouring of a concrete foundation and walls/abutments; installation of the crossing structure; and placement of bioengineered or rock slope protection (RSP) to protect abutments, piers, and walls.

Any new or replacement crossing, culvert, or bridge that intersects potential habitat for listed salmonid species will meet CDFW and/or NMFS fish passage criteria.

Design guidelines for this project type include:

- All stream crossing projects should consider storm-proofing guidelines presented in Weaver et al. (2015). Culverts should also conform to design guidelines for conveyance of the 100-year peak flow and associated sediment and wood loads, as specified in Cafferata et al. (2017).
- Projects in channels that provide potential spawning and/or rearing habitat for anadromous salmonids should follow NMFS guidelines for salmonid passage at stream crossings.
- Bridges and culverts should be designed to adequately convey flow and materials (e.g., the 100-year flood) in addition to allowing fish passage. If a bridge or culvert is designed to convey less than the 100-year design flow, the Project Proponent should demonstrate how the smaller culvert avoids excessive erosion/sedimentation, headcutting, or habitat impacts.
- NMFS Stream Simulation Design should be used to inform project design.
- Structures should be designed to provide passage for all life stages of native fish species.
- Bridges (including concrete box culverts, which are constructed as bridges in accordance with current NMFS and CDFW guidelines) should be designed with vertical abutments. Treated wood should not be used for bridge construction or replacement.
- Placement of RSP within the bankfull width of the stream should be avoided except for the minimum necessary for protection of bridge abutments and pilings, culverts, and other stream-crossing infrastructure. The amount and placement of any RSP should not constrict the bankfull flow. RSP should not create barriers to fish or wildlife, and therefore should typically be buried with natural stream material or planted organic material. The toe of RSP used for streambank stabilization should be placed sufficiently below the streambed scour depth to ensure stability. Where RSP is deemed necessary, the use of bioengineered techniques provided in Section 4.3.3, *Bioengineered Bank Stabilization,* should be incorporated.
- Drivable low water crossings (*i.e.*, ford) should be appropriately armored on the downstream side to reduce the potential for scouring.

Fish Screens

This category includes the installation, operation, and maintenance of fish screens on existing water intakes. Constructing/installing a fish screen usually includes site excavation; forming and pouring a concrete foundation and walls; and installation of the fish screen structure. Typically, if the fish screen is placed in or near flood-prone areas, rock or other armoring is installed to protect the screen. Fish screen types include self-cleaning screens (including flat plate and other designs, including rotary drum screens and cone screens, with a variety of cleaning mechanisms) and non-self-cleaning screens (including tubular, box, and other designs).

All fish screens will be consistent with NMFS (NOAA 2022) or CDFW fish screening criteria.

Fishways

This project type includes removing, relocating, constructing, repairing, or operating and maintaining fishways, as well as removing fishways. This project type includes riffle-pool complexes (e.g., rock/boulder ramps) that bypass passage barriers and installation of fishways that bypass barriers.

Constructing and/or installing fishways can include site excavation, formation, and pouring of a concrete foundation and walls; pile driving; excavation and installation of an entry and exit channel; and installation of the fishway structure. Heavy equipment is typically used for excavation of the site.

Design guidelines for this project type include:

- Fishway projects should conduct watershed and reach scale analysis of the hydrograph; sediment; large woody debris supply and transport; and streambed and bank dynamics (e.g., is the channel actively incising or aggrading) to confirm that the proposed design is appropriate and expected to function as designed over the lifetime of the project (20 to 30 years).
- Fishways should be designed based on target species, level of maintenance, and monitoring requirements for reliable fish passage.
- Design fishways considering passage for other aquatic wildlife (e.g., amphibians) in addition to that of salmonids, sturgeon, and other native fish species. Fishways primarily designed for salmonids can be impediments to passage of other aquatic species if they do not have adequate surfaces for attachment, velocities are too high, or there are inadequate places for resting. For example, providing for rounded corners, resting areas, or providing a natural stream channel (stream simulations) or wetted ramp for passage over the impediment have been effective in facilitating passage of other aquatic wildlife.

2.1.3.2. Removal of Small Dams, Tide Gates, Flood Gates, and Legacy Structures

These restoration projects are designed to reconnect stream corridors, floodplains, and estuaries; establish wetlands; improve aquatic organism passage; restore more natural channel and flow conditions; restore fisheries access to historical habitat for spawning and rearing; and improve long-term aquatic habitat quality and stream geomorphology. All proposed restoration projects will be designed with seasonal construction considerations to minimize the potential adverse effects to water quality and/or aquatic species.

This project type involves removing small dams, tide gates, flood gates, and legacy structures to improve fish and wildlife migration; tidal and freshwater circulation and flow; and water quality. This project type may also include separation of streams from artificial impoundments (e.g.,

ponds or lakes) by realigning and/or rerouting channels around these artificial waterbodies and/or through the use of vertical concrete or sheet-pile walls.

Removal of Small Dams

Small dams are removed to restore fisheries access to historical habitat for spawning and rearing, and to improve long-term habitat quality and proper stream geomorphology. Types of eligible small dams include permanent, flashboard, debris basin, earthen, and seasonal dams that possess the characteristics listed below.

Small dams included in the Proposed Restoration Effort are defined by the California Division of Dam Safety as dams of non-jurisdictional size. Those dams are smaller in height or impounding capacity than those defined in California Code 2002 (Division 3, Part 1, Chapter 1, 6002), where "dam" means:

> Any artificial barrier, together with appurtenant works, which does or may impound or divert water, and which either (a) is or will be 25 feet or more in height from the natural bed of the stream or watercourse at the downstream toe of the barrier, as determined by the department, or from the lowest elevation of the outside limit of the barrier, as determined by the department, if it is not across a stream channel or watercourse, to the maximum possible water storage elevation, or (b) has or will have an impounding capacity of 50 acre-feet or more.

Dams under Federal Energy Regulatory Commission jurisdiction are also generally not eligible for removal under this Proposed Restoration Effort because they are typically larger than the proposed size criteria found in Water Code Section 6002.

Implementing small dam removal projects may require the use of heavy equipment (e.g., self-propelled logging yarders, mechanical excavators, backhoes, or jackhammers). Any use of explosives for small dam removal must be justified by site-specific conditions, including equipment access difficulties. The use of explosives must occur in dry or dewatered conditions; potential harm to Covered Species from the explosives' blast and pressure waves must be analyzed.

Proposed restoration projects meeting any of the following conditions are ineligible for the Proposed Restoration Effort:

- Sediments stored behind the dam that have a reasonable potential to contain environmental contaminants (dioxins, chlorinated pesticides, polychlorinated biphenyls, or mercury) beyond the freshwater probable effect levels summarized in the NOAA Screening Quick Reference Table guidelines (NOAA 2008)
- Require a more detailed analysis due to the risk of significant loss or degradation of downstream spawning or rearing areas by sediment deposition.

Sites will be considered to have a reasonable potential to contain contaminants of concern if they are downstream of historical contamination sources such as lumber or paper mills, industrial sites, mining sites, or intensive agricultural production going back several decades because

chlorinated pesticides were legal to purchase and use in the past. Therefore, preliminary sediment sampling is advisable in these areas to determine whether a project would be eligible for the Proposed Restoration Effort.

Conversely, small dams that do not have historical contamination sources in the upstream watershed are considered to have low potential to contain contaminants; therefore, they could be considered low risk with reduced sediment sampling and evaluation.

This Proposed Restoration Effort only includes dam removal that forms a channel at natural grade and shape upstream of the dam, naturally or with excavation, to minimize negative effects on downstream habitat. Dam removal projects shall:

- Have a volume of sediment available for release that is small relative to the size of the stream channel and that—when released by storm flows—will have minimal effects on downstream habitat, as verified by a Qualified Biologist and reviewed by either CDFW or NMFS engineers; or
- Be designed to remove sediment trapped by the dam down to the elevation of the target thalweg, including design channel and floodplain dimensions.

Design guidelines for this project type include use of one of the following methods to restore the channel in a small dam removal project: natural channel evolution or "stream simulation" design. The conditions under which each of these methods would be used are as follows:

- **Natural channel evolution:** The natural channel evolution approach to restoring a channel bed would consist of removing all hardened portions (by hand efforts, heavy equipment, or explosives) of a dam and allowing the stream's natural flows to naturally shape the channel through the project reach over time. This method would only be used in the following situations: (1) when risks are minimal (or all risks can be mitigated) to any of the downstream habitats and the aquatic organisms inhabiting them (based on the amount and size gradation of the material being stored above the dam) if all of the sediment upstream of the dam is released during a single storm event; (2) when the project reach has sufficient space and can be allowed to naturally adjust based on any land constraints, with minimal risk to riparian habitat; (3) when project implementation follows procedures that have been documented as having been successfully performed elsewhere under similar circumstances; and (4) when notching the dam in increments after periodic storm events to reduce the amount of sediment being released during any individual storm event, provided project funding is sufficient to allow the dam to be completely removed within the proposed project timeframe.
- **Stream simulation:** Stream simulation design relies on the duplication of morphological conditions observed in a natural reference reach throughout the project reach. Stream simulation designs would be used in extreme situations where excessive sediment releases pose a threat to downstream habitat and organisms. Specifically, the sediment upstream of the dam would be physically removed and the channel through the excavated reach would be designed using stream simulation. Stream simulation designs would be conducted in accordance with known stream restoration and fish passage guidance documents. This

specifically includes: (1) the identification of a suitable reference reach; (2) quantification of the average cross-sectional shape, bank full width, bed and bank sediment grain size distributions, and geomorphic features of the channel (e.g., pool-riffle sequences, meander lengths, and step pools); and (3) reproduction of the geomorphic features found in the reference reach in the project reach.

Data Requirements and Analysis:[3]

- Use a longitudinal profile of the stream channel thalweg for a distance at least equal to 20 channel widths upstream and downstream of the structure and long enough to establish the natural channel grade—whichever is farther—to determine the potential for channel degradation (as described in the CDFW Manual).
- Use a minimum of five cross-sections: one downstream of the structure, three roughly evenly spaced through the reservoir area upstream within the influence of the structure, and one upstream of the reservoir area outside of the influence of the structure, to characterize the channel morphology and quantify the stored sediment.
- Use sediment characterization in the reservoir and within a reference reach of a similar channel to determine the proportion of coarse sediment (>2 millimeters) in the reservoir area and determine the target sediment composition.
- Use a habitat typing survey (CDFW Manual Part III, Habitat Inventory Methods) that maps and quantifies all downstream spawning areas that may be affected by sediment released by removal of the water control structure.

Removal of Tide Gates and Flood Gates

Removal of or upgrades to existing tide and flood gates involve modifying gate components and mechanisms in tidal stream systems where full tidal exchange is incompatible with current land use (e.g., where backwater effects are of concern). Tide/flood gate replacement or retrofitting include such activities as installation of temporary cofferdams and dewatering pumps, and excavation of existing channels, adjacent floodplains, flood channels, and wetlands; and may include structural elements such as streambank restoration and hydraulic roughness.

The placement of new gates where they did not previously exist does not meet the eligibility requirements for the Proposed Restoration Effort. The replacement of tide gates meets the eligibility requirements only if the Proposed Restoration Project can demonstrate that such replacement would increase or enhance ecological processes. Tide and flood gates may be plugged by removing the culvert and backfilling the berm or levee, to prevent fish from potentially accessing unsuitable habitat.

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[3] These requirements apply only to instream habitat design for small dam removal projects. As described in Section 1.5, the "Action Area" is defined as "all areas to be affected directly or indirectly by the Federal Action" and in most cases will include uplands adjacent to aquatic/riparian restoration project sites.

Excavators, cranes, boats, barges, pumps, dump trucks, and similar equipment are typically used to implement the projects in this category.

Design guidelines for this project type include:

- If a culvert and bridge will be constructed at the location of a removed tide gate, consider designing the structure to allow for full tidal exchange.

Removal of Legacy Structures

This activity includes the removal of nonfunctioning in-channel and floodplain legacy habitat structures (e.g., grade control structures and defunct boulder weirs) to improve water quality and channel geomorphology.

Excavators, cranes, boats, barges, pumps, dump trucks, vibratory pile drivers, and similar equipment are typically used to implement the projects in this category.

Design guidelines for this project type include:

- If the structure being removed contains material (e.g., large wood, boulders, concrete) not typically found in the stream or floodplain at that site, consider disposing of removed material at an approved landfill or disposal site.
- If the structure being removed contains material that is typically found in the stream or floodplain at that site (e.g., large wood or boulders), the material could be reused to implement habitat improvements described under other restoration project types in the Proposed Restoration Effort.
- If the structure being removed is keyed into the bank, consider filling in "key" holes with native materials to restore contours of stream bank and floodplain. Fill material should be adequately compacted to prevent washing out of the soil during over-bank flooding. Material from the stream channel should not be mined to fill in "key" holes.
- When removal of buried log structures may result in significant disruption to riparian vegetation or the floodplain, consider using a chainsaw to extract the portion of log in the channel and leaving the buried sections in the streambank.
- If the legacy structures (log, rock, or gabion weirs) were placed to provide grade control, the site should be evaluated for potential headcutting and incision due to structure removal. If headcutting and channel incision are likely to occur due to structure removal and are not desired to achieve proper functioning habitat conditions, additional measures should be taken to minimize these impacts.

2.1.3.3. Bioengineered Bank Stabilization

Bioengineered bank stabilization projects improve riparian and stream habitat by increasing stream shade to lower stream temperatures, production of invertebrates, future recruitment of large woody material to streams, and bank stability. These project types increases the number of

plants and plant groupings, and includes natural regeneration, exclusion fencing for livestock, bioengineering, and revegetation.

To improve aquatic and riparian habitats and reduce soil erosion and sedimentation of streams and wetlands, bioengineered bank stabilization integrates living woody and herbaceous materials with earthwork and recontouring of streambanks. Both organic and inorganic materials are put into place to stabilize and improve the structure of the soil where site constraints limit opportunities for natural channel meander. Bank stabilization structures that use bioengineering techniques minimize many of the impacts on aquatic resources commonly caused by traditional or conventional engineered bank structures.

Examples of bioengineering project types include revetment consisting of trees, native plant materials, or willow walls; willow siltation baffles; brush mattresses; brush check dams; and brush bundles. Bioengineered project types may also include the placement of buried riprap, with soil and vegetation plantings on top.

Bioengineered bank stabilization techniques use a minimal amount of hard materials (e.g., rock) and are not intended to include traditional hard engineering techniques. Part XI of the CDFW Manual, *Riparian Habitat Restoration,* contains examples of these techniques.

Bioengineered bank stabilization structures are suitable for many low-order, low-gradient stream segments where the channel is not aggrading or degrading rapidly, and where there is sufficient space to reshape the eroding bank to an appropriate slope.

The use of boulders should be limited in scope and quantity, to the minimum necessary to stabilize the slope and protect it from expected streamflows during storms. Boulder structures must be part of a larger restoration design and must include a riparian revegetation element. Bridge abutments and other structural improvements installed in the restoration design of fish passage projects may require additional stabilization with boulder and rock banks.

Guidelines for streambank stabilization techniques are described in Part VII, *Project Implementation,* of the CDFW *Riparian Habitat Restoration Manual* (CDFW 2010: Vol. I or subsequent updates).

Proposed restoration projects in this category may require the use of heavy equipment (e.g., self-propelled logging yarders, excavators, backhoes, or dump trucks).

Design guidelines for this project type include:

- Damaged streambanks should be restored to a natural slope and profile suitable for establishment of riparian vegetation.
- When necessary, the use of soil layers or lifts strengthened with biodegradable fabrics that are penetrable by plant roots should be considered.
- To the extent it would naturally occur, large wood should be included. Wood should have untrimmed root wads to provide functional refugia habitat for fish. Wood that is already in the stream or suspended over the stream may be repositioned to enable greater interaction with the stream.

- A diverse assemblage of vegetation species that is appropriate for the project area, including trees, shrubs, and herbaceous species, should be used. Vegetation, such as willow, sedge, and rush mats, may be gathered from abandoned floodplains and stream channels if the soil is not contaminated with pathogens.
- Fencing and signage should be installed as necessary to prevent access to revegetated sites by livestock or unauthorized people. Coordination with local public agencies (e.g., police and social work groups) should be considered for site protection.
- The extent and quantity of rock or boulders should be limited to the minimum necessary to prevent scour from expected moderate to high stream flows and velocities. Bridge abutments and other infrastructure improvements to the restoration design of fish passage projects may require additional boulder and rock bank stabilization.

2.1.3.4. Restoration and Enhancement of Off-Channel and Side-Channel Habitat

Restoring and enhancing off-channel and side-channel habitat features helps to improve aquatic and riparian habitat for fish and wildlife. This project type has the following benefits:

- Increases habitat diversity and complexity
- Improves heterogeneity (e.g., nonuniform) of flows
- Provides long-term nutrient storage and substrate for aquatic macroinvertebrates
- Moderates flow disturbances
- Increases retention of leaf litter
- Provides refuge for fish during high flows

Restoration projects proposed for side-channel or off-channel habitat also typically improve hydrologic connection between main channels and their floodplains.

This project type typically involves reconnecting and creating side-channel, alcove, oxbow, pond, off-channel, floodplain, and other habitats, and potentially removing off-channel fill and plugs. New side-channels and alcoves may be constructed in geomorphic settings that will accommodate such features. This activity category typically applies to areas where side channels, alcoves, and other backwater habitats have been filled or blocked from the main channel, disconnecting them from most if not all flow events.

Work may involve removing or breaching levees, berms, and dikes; excavating channels; constructing wooden or rock tailwater (waterbodies downstream of a dam or other barrier) control structures; and constructing large wood habitat features.

This project type can also involve the use of logs or boulders as stationary water-level control structures. With the exception of off-stream storage projects to reduce low-flow stream

diversions, projects involving the permanent installation of a flashboard dam, head gate, or other mechanical structure are not eligible for the Proposed Restoration Effort.

Excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement proposed restoration projects.

Design guidelines for this project type include:

- Off- and side-channel habitat restoration site selection and design should be based, in part, on the review of evidence of historical channel location, such as land use surveys, historical photographs, topographic maps, remote sensing information, or personal observation.
- Excavated material removed from off- or side-channels should be hauled to an upland site or spread across the adjacent floodplain, as long as the soil is considered suitable for application (e.g., free of contaminants and/or pathogens) in a manner that does not restrict floodplain capacity or otherwise degrade floodplain function.
- Where Covered Species that require access to stream habitat are present, off-channel features should be designed to slope toward and drain to the primary stream habitat as streamflow subsides. Isolated pools or ponds that do not incorporate return channels to the stream should be situated at an appropriate distance from the edge of the active channel to avoid temporary connectivity and subsequent fish stranding following flood events. Proposed restoration projects should not result in stranding of fish in isolated waterbodies.

2.1.3.5. Water Conservation Projects for Enhancement of Fish and Wildlife Habitat

Creation, operation, and maintenance of water conservation projects—including off-stream storage tanks and ponds and associated off-channel infrastructure—reduce low-flow stream diversions and enhance streamflows, particularly base flows for fish and wildlife habitat during the dry season. These restoration projects typically require placing infrastructure (e.g., pumps, piping, screens, and headgates) in or adjacent to the stream to provide alternative water intake facilities. Exclusion fencing may be constructed to manage grazing in aquatic and riparian habitat, as described in Section 4.3.10*, Establishment, Restoration, and Enhancement of Stream and Riparian Habitat and Upslope Watershed Sites*.

These restoration projects are designed to improve streamflow and riparian habitat for fish and wildlife. Excavators and other heavy equipment may be used to implement proposed restoration projects.

Design guidelines for this project type include:

- Tanks should include water diverters with sufficient storage capacity to cover any domestic, irrigation, or livestock needs during the no-pump time periods, (e.g., dry season). The no-pump time period should be based on the season, local conditions, forbearance agreement, and existing studies, if available.

- All pump intakes should be screened in accordance with current agency fish screen criteria.
- Water conservation projects that include water storage tanks and a forbearance agreement for the purpose of storing winter and early spring water for summer and fall use should be registered. Registration should be done pursuant to California Water Code Section 1228.3 and with the State Water Board, as applicable.

2.1.3.6. Floodplain Restoration

Project types in this category improve the diversity and complexity of aquatic, meadow, and riparian habitat, as well as ecosystem function, because they have the following effects:

- Provide opportunities for sediment to deposit on the floodplain seasonally, which enhances meadow vegetation, bird and mammal use, fish rearing and spawning, and refuge from predators and physical stressors
- Create intermittent hydrological connection between streams and floodplains
- Increase floodway capacity and the frequency and duration of floodway inundation
- Improve ecosystem functions for aquatic and terrestrial species, and also improve water quality
- Reconnect stream channels to floodplains, thus improving the fluvial dynamics of the watershed system, including sediment deposition and channel meander
- Reduce or eliminate areas that strand native fish, provide habitat for nonnative predatory fish, or both
- Provide high-flow and thermal refuges for native fish and other aquatic species

Floodplain restoration projects involve setback, breaching, and removal of levees, berms, and dikes; excavation or fill for hydraulic reconnection (including restoration to stage zero, which creates streams that are fully connected with their floodplains; typically, multi-thread); and revegetation. Floodplain restoration can involve rock placement, specifically as engineered stream material, riffle ramps, weirs, and other strategies to aggrade the channel and enable connectivity to floodplains. Floodplains should mimic natural flooding patterns and remain flooded/inundated for long enough to activate food webs.

These restoration projects generally involve reconnecting historical stream and river channels and freshwater deltas with floodplains and reconnecting historical estuaries to tidal influence through levee removal, setback, and breaching, or construction of floodplain surfaces that connect at base flow. Typically, these restoration projects take place where floodplains and estuaries have been disconnected from adjacent streams and rivers. Levee setback projects include construction of new levees to facilitate removal or breaching of existing levees, and creation of aquatic or riparian habitat. These project types may also include filling or reshaping of on- and off-channel gravel pits. Levees may be adjusted, or a low levee bench may be created to facilitate tidal inundation or channel margin habitat.

Meadow and floodplain restoration may involve reconnecting down-cut channels to their floodplains to restore hydrologic processes and meadow health; filling incised, entrenched channels; creating new stream channels; regrading floodplains or realigning channels; or installing stabilization structures. Incised channels should only be filled if the watershed conditions that triggered incision can be offset by the project. These restoration actions may rely on watershed processes to complete work overtime to restore a channel network and floodplain that supports wetlands or grasslands.

Similar to projects that create off-channel/side-channel habitats, proposed floodplain restoration projects will include information regarding water supply (channel flow, overland flow, and groundwater), water quality, and reliability; risk of channel changes; and channel and hydraulic grade.

Excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement these restoration projects.

Design guidelines for this project type include:

- As applicable, fish passage or screening needs should be addressed with the installation of new structures.

  Design guidelines for channel reconstruction, reset, or relocation projects:

  - Actions should be designed to restore floodplain characteristics—elevation, width, sinuosity gradient, length, and roughness—in a manner that closely mimics or resets those that would naturally occur at that stream and valley type.
  - Nonnative fill material should be removed from the channel and floodplain to an upland site or appropriate offsite disposal location, potentially including a landfill (for anthropogenic debris).
  - Where practicable, geomorphically appropriate stream channels and floodplains (e.g., enable natural transport processes, including the creation of depositional and scour features) should be constructed in a watershed and reach context, to connect channels to floodplains at baseflow.
  - When necessary, soils should be decompacted once overburden material is removed. Overburden or fill, consisting of pathogen-free and native materials that originated in the project area, may be used in the floodplain to support the project goals and objectives.
  - Structural elements should fit within the geomorphic context of the stream system and valley type. For example, construct riffles preferentially in pool-riffle stream types, and roughened channels and boulder step structures in step-pool and cascade stream types.
  - Weed-free and—if possible—locally occurring material (large wood, rock, sand, or gravel) should be selected and mimic natural stream system materials.
  - Existing native materials (e.g., rock, gravel, large wood, sod, willows, topsoil) should be salvaged and used.

- Design guidelines for restoration projects that involve setback or removal of existing berms, dikes, and levees:
  - Actions should be designed to restore floodplain characteristics—elevation, width, gradient, length, and roughness—in a manner that closely mimics those that would naturally occur in that area.
  - Drain pipes, fences, concrete, and other structural improvements should be removed.
  - Nonnative fill material should be removed from the floodplain and, if pathogen-free, reused or disposed of it at an upland site. Trash and debris should be disposed of at an appropriate offsite location, potentially including a landfill (for anthropogenic debris).
  - Where it is not possible to remove or set back all portions of dikes and berms, or in areas where existing berms, dikes, and levees support abundant riparian vegetation and their removal or setback is not part of the project design, openings may be created with carefully planned and approved breaches. Timing and spacing of breaches should be planned for maximum positive environmental outcomes.
  - When necessary for plant establishment, compacted soils should be loosened once overburden material is removed. Overburden or fill consisting of native materials that originated from the project area may be used in the floodplain (if pathogen-free) to create setback dikes and fill anthropogenic holes, provided that floodplain function is not impeded.

2.1.3.7. Removal of Nonnative Terrestrial and Aquatic Invasive Species and Revegetation with Native Plants

Removing nonnative terrestrial and aquatic invasive species and/or revegetating with native plants improves aquatic, riparian, and wetland habitat for fish and wildlife in a variety of ways. These proposed restoration projects are designed to improve or provide the following benefits:

- Composition, structure, and abundance of native biological communities important for bank stability and species habitat
- Stream shading, riparian canopy, and understory establishment and diversity
- Input of large wood and other organic material into streams
- Nesting and roosting habitat
- Reduction of soil erosion
- Water quality improvement
- Greater dune stability and habitat complexity
- Improved soil health

- Other ecological benefits, all of which are important elements of species habitat and water quality

Removal of Nonnative Terrestrial and Aquatic Invasive Species

Manual, mechanical, and chemical methods can be used independently or in combination to remove invasive species from aquatic and riparian areas. Sites with a variety of invasive species may receive several different types of treatments. As applicable, Best Management Practices for Wildland Stewardship: Protecting Wildlife When Using Herbicides for Invasive Plant Management (Cal-IPC 2015 or the most recent version) will be followed. If the guidance cannot be followed as applicable, then a project-specific Integrated Pest Management (IPM) Plan will be submitted with the ESA Section 7(a)(2) Review Form.

This project type also includes removal and/or management of nonnative predatory fish and other nonnative fish and wildlife, as long as the activity is associated with a Proposed Restoration Project.

Revegetation with Native Plants

Revegetation with native plants should mimic the area's naturally occurring wetland, riparian, or aquatic habitats and use seed or plant stock from the local watershed. Activities may include:

- Planting and seeding native trees, shrubs, and herbaceous plants
- Placing sedges, rushes, grasses, succulents, forbs, and other native vegetation
- Gathering and installing willow cuttings, stakes, mats, and fences
- Temporary irrigation
- Coordination with upstream operators to control dam releases or instream flow levels to provide water during plant establishment

Design guidelines for this project type include:

- The species palette for revegetation should be designed based on the species that naturally or historically occur in the project area, have the best chance of survival considering current site conditions, and can provide required habitat elements.
- Control nearby vegetation that will compete with plantings, especially weed species listed as invasive in the Cal-IPC Inventory. This could include clearing and maintaining a 24" diameter buffer around plantings.
- The soil should be tested and prepared prior to planting. The soil in planting and seeding areas should be finish-graded, pathogen-free, weed-free, decompacted, and amended as appropriate, given the habitat and site conditions. Decompaction to a minimum depth of 6 inches is recommended. All seeds used will not be treated with neonicotinoids.
- Revegetation that is not dependent on irrigation systems is generally preferred; however, there can be instances where irrigation is desirable. If using an irrigation system is necessary

for plant establishment, the system should be installed and operational prior to installation of planting, or prior to any periods where the weather forecast may jeopardize successful establishment of plants.

- Native seed or plant sources should be acquired as close to the project site as possible. Seeds should be kept in a cool, dry place during delivery and when temporarily stored onsite. Seeds should be protected from moisture, wind, heat, vandalism, rodents, insects, weather, and other conditions that would damage or impair their viability.
- For installation of pole cuttings, cuttings should be sourced from healthy plants, limiting collection to no more than 30 % of individual plants or populations. Pole cuttings should be taken from live wood at least 1 year old or older. Cuttings should be kept moist until planted and should be installed at a depth sufficient to allow root growth into the groundwater table, or as necessary to provide long-term survival of the planting.
- Prefabricated vegetated mats (i.e., sedge and rush mats) should be appropriately sized in the riparian zone, channels, floodplains, and areas with high runoff, to prevent their movement during high-flow events.
- Cuttings should be planted when dormant and within 48 hours of collection. Cuttings should not be dried.
- Plantings should be enclosed with fencing, cages, tubex, or other protection measure, as appropriate, in areas where plantings are subject to forage by animals (e.g., deer, elk, beavers, livestock, gophers, or moles). Any nonbiodegradable fencing material should be removed after plantings are adequately established.

2.1.3.8. Removal of Pilings and Other In-Water Structures

Untreated and chemically treated wood pilings, piers, vessels, boat docks, derelict seawalls (in embayments), derelict fishing gear; and similar structures built using plastic, concrete, and other materials may be removed and/or replaced to improve water quality and habitat for fish and wildlife. These restoration projects are designed to remove contaminant sources and hazards from stream, river, and estuary habitats.

Boats, barges, excavators, dump trucks, front-end loaders, and similar equipment may be used to implement these restoration projects.

Design guidelines for this project type include:

- For proposed restoration projects that involve removing an intact pile:
  - A floating surface boom should be installed to capture floating surface debris, as necessary.
  - All equipment (e.g., bucket, steel cable, and vibratory hammer) should be kept out of the water, piles should be gripped above the waterline, and work should be completed during low-water-level and low-current conditions.

  - The piling should be dislodged with an excavator bucket (through pushing and pulling) or vibratory hammer. Avoid intentionally breaking a pile by twisting or bending.
  - Piles should be lifted slowly from the sediment and through the water column.
  - Chemically treated piles should be placed in a containment basin on a barge deck, pier, or shoreline without attempting to clean or remove any adhering sediment. A containment basin for the removed piles and any adhering sediment may be constructed of durable plastic sheeting, with sidewalls supported by hay bales or another support structure to contain all sediment.
  - The holes left by each piling should be filled with clean, native sediments from the project area, if available and as needed.
  - All removed piles, floating surface debris, any sediment spilled on work surfaces, and all containment supplies should be disposed of at a permitted disposal site.
  - Pile cutting should be considered a last resort following multiple attempts to fully extract piling using other methods. If cutting piles, they should be cut below the mudline to provide more habitat and ensure that as much debris is removed as possible. Areas with low levels of contamination, wave, and/or currents conducive to mixing (i.e., high-energy environments) and/or small numbers of piles removed may not need to be cut to prevent remobilization of contaminants.
- For proposed restoration projects that involve removing a broken pile:
  - If dredging is likely in the area of piling removal, use a global positioning system (GPS) unit to record the location of all broken piles for future use in site debris characterization. Test soil prior to dredging to determine whether sediments are contaminated and manage dredged materials appropriately based on testing results.
  - If a pile breaks above the surface of uncontaminated sediment or less than 2 feet below the surface, every attempt short of excavation should be made to remove it entirely.
  - If a pile breaks above presumed or known contaminated sediment, the stump should be sawed off at the sediment line; if a pile breaks in contaminated sediment, no further effort should be made to remove it and the hole should be covered with a cap of clean substrate appropriate for the site, as applicable.

2.1.3.9. Establishment, Restoration, and Enhancement of Tidal, Subtidal, and Freshwater Wetlands

Establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands results in increased primary and secondary production and diversification, and in increased aquatic habitat for a diversity of fish and wildlife species.

Tidal and Subtidal Wetlands

This project type generally involves grading (e.g., creating depressions, berms, and drainage features) and/or breaching (e.g., excavating breaks in levees, dykes, and/or berms) to create topography and hydrology that has the following benefits:

- Supports native marsh plants (planted or recruited naturally)
- Provides habitat elements for target species
- Provides other targeted wetland functions
- Allows fish and other aquatic species to use channel networks and marsh plains with hydrologic variability (seasonally or tidally)

This project type also creates ecotones (transitional zone between two habitat or community types [aquatic and upland interface]), "horizontal levees," and/or setback berms) and/or "living shorelines" that could use fill and excavation with native vegetation (submerged and/or emergent), alone or in combination with offshore sills (e.g., artificial reefs), to stabilize the shoreline.

Creation of ecotones could require extensive beneficial fill and have the potential to affect adjacent existing wetlands; however, these projects are necessary to allow tidal wetlands to respond to sea level rise, and they provide refuge for native wildlife and buffer wetlands from adjacent municipal and industrial land uses.

Living shorelines provide a natural alternative to "hard" shoreline stabilization methods like stone sills or bulkheads; they provide numerous ecological benefits, including water quality improvements; fish and invertebrate habitat; and buffering of shoreline from waves and storms.

Living shoreline projects use a suite of habitat restoration techniques to reinforce the shoreline, minimize coastal erosion, and maintain coastal processes while protecting, restoring, enhancing, and creating natural habitat for fish and aquatic plants and wildlife. Living shoreline design strategies can use rock armoring, rock sill, groin, or breakwater installations only if the use of such design strategies is integral to the restoration basis of design.

This project type includes excavation, removal, and/or placement of fill materials to restore or approximate pre-disturbance site conditions; contouring wetlands to establish more natural topography, hydrology, and/or hydraulics; and setting back, modifying, or breaching existing dikes, berms, and levees.

This project category also includes:

- Constructing transitional tidal marsh habitat (i.e., "horizontal levees," setback berms, or ecotones)
- Backfilling artificial channels
- Removing existing drainage structures, such as drain tiles
- Filling, blocking, or reshaping drainage ditches to restore wetland hydrology

- Establishing tidal/fluvial channels and wetlands in tidal waters where those wetlands previously existed, or have migrated, or will migrate as a result of sea level rise
- Installing structures or fill necessary to establish wetland or stream hydrology
- Constructing nesting/planting islands
- Constructing open water areas
- Constructing noncommercial, native oyster habitat (e.g., reefs) over an unvegetated bottom in tidal waters
- Conducting noncommercial, native shellfish seeding
- Establishing submerged aquatic vegetation (e.g., eelgrass beds) in areas where those plant communities previously existed

Activities needed to establish vegetation—including plowing or disking for preparation of seed beds and planting appropriate wetland species—are also be included.

Project activities that plan for climate change (including sea level rise) will be considered in tidally influenced locations. California's Climate Adaptation Strategy recommends using ecotones and living shorelines as a potential adaptation method to reduce the need for engineered "hard" shoreline protection devices and to provide valuable, functional coastal habitat (CNRA 2018). The California State Coastal Conservancy's (SCC) Climate Change Policy also supports the use of living shorelines for their ability to improve the resiliency of estuarine habitat to future sea level rise and other related effects of climate change (SCC 2011).

Ecotone habitat levees should be used when new exterior levees are required to protect adjacent landowners from the return of tidal inundation. The project side of the levee should be constructed with areas of longer gentle slopes, to accommodate upland refugia for sensitive salt marsh and brackish marsh species during future flood king tides. Interior berms should be disconnected from the adjacent uplands, to reduce access by predators during high tides. In addition, sidecast material should be used during the excavation of new channels, to recontour pond bottoms and achieve the desired hydrology. This would include creating islands disconnected from uplands to provide future upland refugia and nesting areas in larger marshes.

Excavators, graders, bulldozers, dump trucks, front-end loaders, boats, barges, and similar equipment may be used to implement proposed restoration projects.

Design guidelines for this project type include:

- Projects should be implemented to repair or restore estuary functions, while not putting adjacent landowners at increased flood risk once dikes/levees are breached and the project area is flooded.
- Historical channel morphology that supports wetland function should be recreated. Channel designs should be based on aerial photo interpretation, literature, topographic surveys, and nearby undisturbed channels. Channel dimensions (width and depth) should be based on measurements of similar types of channels and the drainage area. For example, channels may

have varied topography throughout their length, to encourage sinuosity of the developing channel.

- Prior to restoration, decommission should take place for infrastructure that was installed historically to drain wetlands or unwanted historical structures, such as duck blinds, docks, or boat hides. Contours created through drain tile removal should be restored by backfilling the ditch with clean fill.
- Temporary access roads should be removed and soils should be decompacted as necessary to support desired revegetation.
- Wetlands should be restored to the elevations necessary to support the desired vegetation communities, accounting for anticipated natural sediment accumulation. Appropriate dredge material or other clean fill material may be imported to raise subsided landscapes, depending on the desired habitat to be restored. Overfill may be necessary to accommodate settling.
- If grading of intertidal plane (landform) is needed, the following guidelines should be implemented to avoid and/or minimize adverse effects to water quality, sensitive resources, and/or Covered Species:
  - After grading of the tidal plane is complete, water management activities should be implemented to revegetate and stabilize exposed soils on the plane, prior to removing the cofferdam and/or breaching dikes or levees.
  - Fish screens should be installed that meet agency criteria, as applicable, on any new pump intakes that could be used for pre-breach water management activities.
  - The following pre-breach water management measures should be implemented:
    - On-site water should be released gradually. Water from the project area will be released gradually to reduce the effect of potentially low dissolved oxygen (DO) and high temperature water on the surrounding waterbody. This would enable the plume of degraded water to dissipate without harmful effects to aquatic life.
    - Water level management activities should be limited during migration periods for Covered Species such as salmon, to reduce the potential effects on these species.
    - Short water residence time (high water exchange rate) should be maintained, to reduce the opportunity for adverse water quality conditions (e.g., high temperature or anaerobic) to develop. Residence time is controlled by the rate at which water is exchanged between the managed area and its adjacent tidal source. Projects will use appropriate water control structures that facilitate flexibility in management, to avoid and/or minimize adverse water quality conditions.
- For proposed restoration projects that include the use of donor vegetation beds for use in restored marsh and/or emergent or submerged vegetation sites, no more than 5 % of the below ground biomass of an existing donor bed should be harvested for transplanting purposes. Plants harvested should be taken in a manner that thins an existing bed without leaving any noticeable bare areas. Harvesting of flowering shoots for seed buoy techniques

should occur only from widely separated plants, and only a certain percent of the donor stock should be used per year. This% is site-dependent and prior to restoration requires intimate knowledge of the genetics and population dynamics of the donor site.

- Shellfish substrate should be placed to encourage oyster larval recruitment. Restoration sites are typically subtidal or intertidal on unvegetated, soft bottom estuarine areas. Rarely, substrate may be placed on hard substrate that represents former reef habitat, but only if the hard substrate is not currently producing oysters at a sustainable level. Natural substrate (oyster or clam shells) is preferred because oysters have an affinity for it, but it is not always available. Shells are most often deployed loose or in mesh bags. Artificial substrate should be used when there is not enough shell substrate available to create larger reef areas, or when the bottom substrate is unstable and substantial sinking of the reef is likely to occur. Common artificial substrates include limestone rock and baycrete (e.g., Reef Balls, Oyster Castles). Regardless of type, most substrate is deployed from a boat or barge; but in some shallow water situations, restoration practitioners and community volunteers may carry the substrate to the reef location.
- If the local population is not large enough to produce viable larvae or has been fully extirpated from the area, live shellfish should be released into the restoration area. Single oysters or oyster spat should be released on shell. Non-reef-forming organisms such as clams and abalone should be released as individuals, caged as necessary (e.g., to reduce predation).
- Shell or other substance used for substrate enhancement should be procured from clean sources that do not deplete the existing supply of shell bottom. Shells should be left on dry land for a minimum of 1 month before placement in the aquatic environment. Shells from the local area should be used whenever possible.
- Species native to the project area should be used where possible. Any shellfish transported across state lines or grown through an aquaculture facility should be certified disease-free.

Vernal Pools and Coastal Dunes

These proposed restoration projects also establish, maintain, restore, or enhance off-channel and vernal pools and their surrounding uplands to support habitat for amphibians and vernal pool plants and animals. These proposed restoration projects involve grading, restoration, and associated monitoring in depressions, swales, and other shallow channels, and seasonal or perennial ponded features within a variety of landscapes including but not limited to grasslands, woodlands, and coastal dune ecosystems.

Restoration projects that would result in a net loss of vernal pool or other wetland habitat would not be eligible for this programmatic consultation and should seek individual consultation.

Managed Wetlands

Managed wetlands are typically surrounded by levees and flooded with water from irrigation district conveyance systems, rivers or sloughs, and/or deep wells. The timing of flooding and depth of water are managed for the benefit of listed species (e.g., giant garter snake), species of

management concern (e.g., waterfowl and shorebirds), or wetland vegetative response. Infrastructure may include delivery ditches; water control structures that allow controlled ingress and egress of water; pumps; and associated pipelines. These restoration projects involve earthwork, contouring, including creation and realignment of swales, internal berms and levees, and reinforcement of the perimeter levees. Excavators, graders, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement proposed restoration projects.

Proposed restoration projects that would cause listed aquatic species stranding (i.e., those without controls that provide functional separation of the species from the project supported by the new diversion) would not be eligible for this programmatic consultation and should seek individual consultation.

2.1.3.10. Establishment, Restoration, and Enhancement of Stream and Riparian Habitat and Upslope Watershed Sites

Stream and Riparian Habitats

Establishing, restoring, and enhancing stream and riparian habitats provides the following benefits:

- Habitat complexity, diversity, and cover for wildlife species
- Increased spawning and rearing habitat
- Improved migration corridors
- Improved pool habitat and pool-to-riffle ratios
- Restoration of sinuosity
- Improved water quality
- Reconnection of the channel to the floodplain

These restoration projects may typically include the following activities:

- Placing large woody material
- Constructing engineered logjams
- Installing small wood structures or beaver dam analogues
- Enhancing native riparian vegetation
- Conducting bank stabilization and erosion control work
- Stabilizing headcuts
- Augmenting and placing gravel
- Removing and replacing concrete-lined channels with natural materials

Project activities may also include excavating, sorting, placing, and contouring existing on-site materials (e.g., historical mine tailings) on perched floodplains and in channels, to reconnect those habitats and improve spawning and rearing conditions.

Project types in this category typically occur in areas where channel structure is lacking due to past stream cleaning (large woody material removal), riparian timber harvest, historical grazing and meadow dewatering practices, hydromodification, and urbanization; and in areas where natural gravel supplies are low due to anthropogenic disruptions. These projects would occur in stream channels and adjacent floodplains to increase channel stability, rearing habitat, pool formation, spawning gravel deposition, channel complexity, hiding cover, low-velocity areas, and floodplain function. Helicopters, excavators, dump trucks, front-end loaders, full-suspension yarders, and similar equipment may be used to implement projects.

Engineered logjams are large wood structures that include an anchoring system, such as rebar pinning, ballast rock, or vertical posts. These structures are designed to redirect flow and change scour and deposition patterns and are patterned after stable natural log jams. They are anchored in place using rebar, rock, or piles (driven into a dewatered area or the streambank, but not in water). Engineered log jams create a hydraulic shadow, which is a low-velocity zone downstream that allows sediment to settle. Scour holes develop adjacent to the engineered logjam. While providing valuable fish and wildlife habitat, they also redirect flow and can stabilize a streambank or downstream gravel bar.

Large woody material may be installed using either anchored or unanchored logs, or both, depending on site conditions and wood availability. Wood-loading methods may include but are not limited to direct felling; whole tree tipping/placement; tree placement by helicopters, grip hoisting, or excavator; and other techniques. Establishment, restoration, and enhancement of stream habitats may also include the following activities:

- Removing revetment and other streambank armoring materials
- Installing grade control structures using native/natural materials to improve general habitat and water quality, thus allowing establishment of native vegetation for birds, fish, and other species
- Improving stream morphology and channel dynamics; restoring sediment input and retention balance; and improving water quality
- Placing boulder structures (e.g., roughened channels, boulder ramps/riffle ramps, boulder weirs, vortex boulder weirs, boulder clusters, and single and opposing boulder wing deflectors)
- Placing imported spawning gravel

In addition, infrastructure along streams and in riparian areas may be removed or relocated. The primary purpose of infrastructure removal is to eliminate or reduce impacts on riparian areas and vegetation, improve bank stability, reduce erosion, reduce sedimentation into adjacent streams, and provide for native revegetation or natural native plant recruitment. Among the types of infrastructure that could be removed or relocated are boat docks, boat haul-out locations,

campgrounds, campsites, day-use sites, roads/trails, and off-highway/off-road vehicle routes that impact aquatic resources or riparian habitat. Further detail on removal of in-water structures is provided in Section 2.1.3.8, *Removal of Pilings and Other In-Water Structures*.

Design guidelines for each specific category of activity include:

- For large wood and engineered logjams:
  - For the purposes of large wood placement, trees may be felled or pulled/pushed over, if tree felling does not significantly degrade the habitat of Covered Species (i.e., an active nest site), create excessive stream bank erosion or temperature increases in waterbodies, destabilize stream banks, or concentrate surface runoff.
  - Trees should be retained if they are killed through fire, insects, disease, blow-down, and other means rather than felling live trees for the project. Snags and trees should be retained if they have broad, deep crowns ("wolf" trees), damaged tops, or other abnormalities that may provide a valuable wildlife habitat component.
  - Stabilizing or key pieces of large wood should be intact, hard, with little decay; and, if possible, have root wads (untrimmed) to provide functional refugia habitat for fish.
  - Key pieces should be oriented so that the hydraulic forces on the large wood increase stability. Wood members that are oriented parallel to flow are typically more stable than members oriented at 45 or 90 degrees to the flow. Large wood and boulders should be placed in areas where they would naturally occur and in a manner that closely mimics natural accumulations for that stream type. For example, boulder placement may not be appropriate in low-gradient meadow streams. Engineered logjams should be patterned (to the greatest degree practicable) after stable natural log jams in the project area, either present or historical.
  - Project design should simulate log jams, debris flows, wind throw, tree breakage, and other disturbance events.
  - For engineered logjams that occupy greater than 25% of the cross-sectional bankfull area, fish passage should be maintained consistent with NMFS and CDFW guidelines.
  - Operating tractors, vehicles, or equipment on soils with a high or extreme erosion hazard rating, known slides, or unstable areas (including slopes greater than 50% grade) should be avoided. On these high-erosion soils with grades greater than 60%, aerial or cable operations may be necessary to retain bank stability.
  - If large wood anchoring is required, a variety of methods could be used. These include buttressing the wood between riparian trees or using manila, sisal, or other biodegradable ropes for lashing connections. If hydraulic conditions warrant the use of structural connections, rebar pinning or bolted connections could be used. Clean rock could be used for ballast but is limited to that needed to anchor the large wood.

- For stream channel reconstruction:

  In situations where excessive sediment releases from the project site or surrounding watershed currently pose a threat to downstream habitat and organisms, use stream simulations following NMFS Stream Simulation Design to inform the project design. Stream simulation designs should:

  - Identify a suitable reference reach.
  - Quantify the average cross-sectional shape; bankfull width; bed and bank sediment grain size distributions; and geomorphic features of the channel (e.g., pool-riffle sequences, meander lengths, step pools).
  - Reproduce the geomorphic features found in the reference reach in the project reach.
  - Design guidelines for headcut stabilization:
  - Where appropriate (i.e., low risk to property and infrastructure), project design should consider avoiding headcut stabilization and allow the stream to naturally adjust to a new grade. Where headcut stabilization is necessary, fish passage should be provided through constructed riffles for pool/riffle streams, or a series of log or rock structures for step/pool channels, as described below.
    - The headcut should be armored with sufficient amounts of appropriately sized and installed material to prevent continued upstream migration of the headcut. Materials can include both rock and organic materials.
    - Use of gabion baskets, sheet piles, concrete, articulated concrete blocks, or cable anchors for headcut stabilization should be avoided.
    - Stabilization efforts should be focused on the plunge pool, the headcut, and a short distance of stream above the headcut.
    - Lateral migration of the channel around the headcut ("flanking") should be minimized by placing rocks and organic material at a lower elevation in the thalweg, to direct flows to the natural low point of the channel.
  - If large wood and boulder placement will be used for headcut stabilization, refer to conditions for Large Wood, as described above.
  - Structures should be constructed in a "V" or "U" shape, oriented with the apex upstream, and lower in the center or along the thalweg, to direct flows to the middle of channel.
  - To minimize structure undermining due to scour, structures should be keyed into the streambed at least 2.5 times their exposure height. The structures should also be keyed 8 feet into both banks, if feasible.
  - If several structures will be used in series, they should be spaced at appropriate distances to promote fish passage of all life stages of native fish. Current agency fish passage criteria (e.g., jump height, pool depth) should be incorporated into the design of step

structures. Spacing should be no closer than the net drop in water surface elevation (in feet) divided by the channel gradient (in percent expressed as a decimal) (e.g., a 1--foot-high step structure in a stream with a 2% gradient will have a minimum spacing of 50 feet [1/0.02]).

  - Gradated (cobble to fine) material should be included in the rock structure material mix to help seal the structure/channel bed, thereby preventing subsurface flow and ensuring fish passage immediately following construction, if natural flows are sufficient.

- Design guidelines for porous boulder structures and vanes:
  - Boulder step structures should be designed and constructed to facilitate upstream and downstream passage of fish species and all life stages that occur in the stream.
  - Rocks for boulder step structures should be sized and selected to ensure they are durable and of suitable quality for long-term stability in the climate where they are to be used. Rock sizing depends on the size of the stream, maximum depth of flow, planform, entrenchment, and ice and debris loading.
  - Full-spanning boulder step structure placement should be coupled with measures to improve habitat complexity and protection of riparian areas, to provide long-term inputs of large wood. Full-channel spanning boulder structures should be installed only where appropriate, such as:
    - in highly uniform, incised, bedrock-dominated channels to enhance or provide fish habitat
    - in stream reaches where log placement is not practicable due to channel conditions (e.g., inadequate space to place logs of sufficient length, bedrock dominated channels, deeply incised channels, or artificially constrained reaches)
    - where damage to infrastructure on public or private lands is of concern
    - where private landowners will not allow log placement due to concerns about damage to their streambanks or property
    - in parts of the state where boulders rather than large wood may typically be the predominant instream habitat feature
  - The use of gabions, cables, or other means of artificial structure should be avoided to prevent the movement of individual boulders in a boulder step structure.
  - Boulder step structures should be placed diagonally across the channel or in more traditional upstream-pointing “V” or “U” configurations, with the apex oriented upstream.
  - Boulder structures should be installed low relative to channel dimensions, so that they would be completely overtopped during a channel-forming flow event (approximately a 1.5-year flow event).

  - The project designer or an inspector experienced in these structures should be present on-site during installation.

- Design guidelines for gravel augmentation:
  - Gravel augmentation should be limited to locations where the natural supply has either been eliminated, significantly reduced through anthropogenic disruptions, or where it can be used to initiate gravel accumulations in conjunction with other projects, such as simulated log jams and debris flows.
  - Gravel should be sized with the proper gradation for the stream, using nonangular rock. When possible, gravel of the same lithology as found in the watershed should be used.
  - Gravel should not be mined from the floodplain at elevations above bankfull in a manner that would cause stranding during future flood events. The use of crushed rock should be avoided.
  - Imported gravel, free of invasive species and nonnative seeds, should be used.
  - Gravel should be placed directly into the stream channel, at tributary junctions, or in other areas in a manner that mimics natural debris flows and erosion.
- Design guidelines for livestock fencing to protect, restore, or establish aquatic or riparian resources:
  - Fence placement should be designed to allow for lateral movement of a stream, migration or dispersal of wildlife through the area, and establishment of riparian plant species. Fences should be placed outside the channel migration zone. Cross-stream fencing should be installed at fords, with breakaway wire, swinging floodgates, hanging electrified chain, or other devices to allow the passage of floodwater and large woody material during high flows.
  - Fence posts or bracing (e.g., dead men) should not be set with wet concrete in waters of the United States or any other aquatic habitat suitable for Covered Species.
  - Fences should be constructed at water gaps in a manner that allows passage of large wood and other debris.
  - Use of riparian fencing to create livestock containment or handling facilities should be avoided.
  - To protect the habitat from livestock damage, wildlife-friendly fences should be constructed around springs.
  - If pressure-treated lumber is used for fence posts, all cutting and drilling should be completed outside the area of expected inundation so that treated wood chips and debris do not enter the channel.
  - Vegetation removal should be avoided and minimized when constructing fence lines. Large, established vegetation should not be removed.

- Design guidelines for livestock stream crossings to protect, restore, or establish aquatic or riparian habitat:
  - Essential livestock stream crossings should be designed and constructed to handle reasonably foreseeable flood risks, including associated bedload and debris; and to prevent the diversion of streamflow out of the channel and down the livestock trail that uses the crossing, if the crossing fails.
  - Existing access roads and stream crossings should be used, unless new construction would result in less habitat disturbance and the old crossing is retired. New livestock stream crossings or water gaps should be located where streambanks are naturally low. Placement of stream crossings should be avoided in or near aquatic habitats for Covered Species; livestock crossings or water gaps should not be in areas where compaction or other damage can occur to sensitive soils and vegetation (e.g., wetlands) due to congregating livestock.
  - The number of stream crossings for livestock in a single reach and across a watershed should be minimized, to limit vegetation disturbance and erosion.
    - Stream crossings and water gaps should be designed and constructed to the narrowest width adequate for expected use, to minimize the time livestock spend in the crossing or riparian area.
    - Livestock loafing in the stream should be discouraged by locating crossings outside of available shady riparian areas, or by including gates in the crossing design. Livestock-only crossings should be at least 6 feet wide and no more than 30 feet wide, as measured from the upstream end to the downstream end of the stream crossing, not including the side slopes.
    - Appropriate rock sizes should be used to accommodate the intended traffic without causing injury to livestock or people, or damage to vehicles using the crossing. For a rock livestock crossing, a hoof contact zone or alternative surfacing method should be used over the rock.

Upslope Watershed Sites

These actions generally target priority roads and trails that contribute sediment to streams or disrupt floodplain and riparian functions. Sites in upslope watershed areas may be restored to reduce delivery of sediment to streams, promote natural hydrologic processes, and restore wildlife habitat and improve water quality. This project type also includes road- and trail-related restoration, including decommissioning, upgrading, and storm-proofing. The following are some of the specific techniques that may be used:

- Removing, installing, or upgrading culverts
- Constructing water bars and dips
- Deep ripping decommissioned roadbeds

- Reshaping road prisms
- Vegetating cut slopes and roadbeds
- Removing and stabilizing side-cast materials
- Grading or resurfacing roads and trails that have been improved for aquatic restoration, using gravel, bark chips, or other permeable materials
- Shaping the contours of the road or trail base
- Replacing road fill with native soils
- Installing new culverts under trails or roads to reduce ditch length
- Stabilizing the soil and tilling compacted soils to establish native vegetation

This project type may also include installing exclusion fencing to manage or prevent grazing access to stream and riparian areas, thus facilitating the establishment of native riparian and stream habitat and the improvement of water quality. In addition, this project type may include controlled access to walkways that livestock use to cross streams and adjacent riparian areas. At stream crossings, gravel may be placed above the ordinary high-water mark in the fenced corridor, to reduce trail erosion and sediment delivery to the stream. Upland watering facilities may be installed to reduce livestock use in riparian areas and stream channels. Planting native plants such as trees, shrubs, forbs, and graminoids may be necessary to manage invasive species and establish a healthy riparian corridor. These restoration projects reduce the impacts of livestock on riparian soils and vegetation, streambanks, channel substrates, and water quality.

Equipment such as excavators, bulldozers, dump trucks, and front-end loaders may be used to implement these restoration projects.

Design guidelines for this project type include:

- The CDFW Manual and Fluvial Habitat Center at Utah State, Low-Tech Process-Based Restoration Design Manual (http://lowtechpbr.restoration.usu.edu/) should be consulted during the planning and design process.

  Design guidelines for road and trail erosion control and decommissioning:

- Road and trail erosion control and decommissioning should use the Handbook for Forest, Ranch and Rural Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Upgrading, Maintaining and Closing Wildland Roads (Weaver et al. 2015) and any subsequent editions.
- When demolishing or removing road segments immediately adjacent to a stream, sediment control barriers should be used between the project and stream.
- Existing vegetative buffers along access roads or trails should be used to avoid or minimize runoff of sediment and other pollutants to surface waters.

- Disturbance of existing native vegetation in ditches and at stream crossings should be minimized.
- The drainage features used for stormproofing and erosion treatment projects should be spaced in such a manner as to hydrologically disconnect road surface runoff from stream channels. If grading and resurfacing are required, clean, permeable materials should be used for resurfacing.
- Activities that compact soil should be avoided or minimized.
- Slide and waste material should be disposed of in stable sites out of the flood-prone area. Clean material may be used to restore natural or near-natural contours.
- For projects in riparian areas, the affected area should be recontoured to mimic natural floodplain contours and gradient.
- For permanent decommissioning of roads, stream crossing fills—including 100-year flood channel bottom widths and stable side slopes—should be excavated. Unstable or potential unstable sidecast and fill slope materials should be excavated if it could otherwise fail and deliver sediment to a stream. Road surface drainage treatments (e.g., ripping, outsloping, and/or cross draining) should be performed to disperse and reduce surface runoff.

Design guidelines for road relocation:

- When a road is decommissioned in a floodplain and future vehicle access through the area is still required, the road should be relocated away from the stream, as far as is practical. New road construction should be outside waters of the United States or any other aquatic habitat suitable for Covered Species.
- The drainage network should not be increased through a road relocation. Relocated road drainage features should be kept disconnected from the stream network. New cross drains should discharge to stable areas where the outflow can quickly infiltrate the soil and not develop a channel to a stream.

Design guidelines for off-channel livestock watering to protect, restore, or establish aquatic or riparian habitat (off-channel watering as it relates to water conservation is discussed further in Section 2.1.3.5, *Water Conservation Projects for Enhancement of Fish and Wildlife Habitat*):

- Springs for livestock source water should be used only in ways that do not significantly damage the function of the spring (e.g., piping, and fencing to keep out livestock), and do not degrade habitat for Covered Species in such a way that the existing population would be permanently negatively affected.
- Withdrawals for livestock watering should not dewater habitats, cause stream flow conditions that adversely affect Covered Species, or significantly reduce habitat value.
- Each livestock water development should have a float valve or similar device, a return flow system, a fenced overflow area, or similar means to minimize water withdrawal and potential runoff and erosion.

- If water intakes are placed in native fish-bearing streams, surface water intakes should be screened to meet current agency fish screen criteria. Screens should be self-cleaning, or regularly maintained by removing debris buildup. Regular inspection should be conducted, along with as-needed maintenance on pumps and screens.
- Troughs or tanks should be placed far enough from a stream, or surrounded with a protective surface, to prevent mud and sediment delivery to the stream. Steep slopes and areas where compaction or damage could occur on sensitive soils, slopes, or vegetation due to congregating livestock should be avoided.
- Troughs and other water capture and storage tanks that are accessible by wildlife should be equipped with properly designed and sized wildlife escape ramps to prevent wildlife from drowning.
- The removal of vegetation around springs and wet areas should be avoided and minimized.
- Part X of the CDFW Manual, Upslope Assessment and Restoration Practices, should be consulted for methods for identifying and assessing erosion, evaluating appropriate treatments, and implementing erosion control treatments.

2.1.4. Typical Construction Activities and Methods

The construction activities would be specific to each type of activity, the location of the activity, and numerous other variables related to the unique characteristics of a project. The magnitude and characteristics of construction activities vary widely, but construction activities for restoration projects share many common features. The following general discussion of construction activities can be anticipated to take place during implementation of the Proposed Restoration Effort.

2.1.4.1. Construction Timing

The time to construct restoration projects can be as short as a few days for minor projects; or as long as several years, or only during certain months of the year, for major projects. Major construction activities are typically concentrated during the dry season (May through October), with some mobilization occurring as early as April; although in some areas, such as the Upper Sacramento River, the in-water work window most protective of listed fish species occurs during the wet season. Work windows may be further limited to avoid and minimize impacts on Covered Species. Construction usually occurs only during daylight hours; however, in rare cases, continuous daytime and nighttime work may be necessary for some activities, expedited projects, and projects where the construction schedule is nearing the flood season.

Depending on weather and river conditions, construction can extend well into November. If a construction phase will extend into the following year's construction season, the site will be secured and "winterized" before the start of the flood season (typically November 15).

Due to local variations in hydrology, and the need to protect Covered Species and other resources, some proposed restoration projects may need to consider alternate construction timing or work windows. All construction would comply with work windows and timing in the Programmatic General Protection Measures; and Guild- and Species-Specific Protection Measures. Project Proponents can propose alternate construction timing in their ESA Section 7(a)(2) Review Form, if necessary for implementation of a Proposed Restoration Project, provided the Project Proponent can demonstrate that measures implemented to avoid or minimize exposure would do so at a level commensurate with the standard work windows. Variances in work timing would be reviewed and approved by the USFWS Field Office as part of the ESA Section 7(a)(2) Review Form process (see Appendix A).

2.1.4.2. Equipment Types

Depending on the type and size of the restoration project, the following are some of the types of equipment that may be used:

- Excavators
- Scrapers
- Bulldozers
- Graders
- Dredgers
- Crawlers/tractors
- Chippers/grinders (to process woody vegetation removed during site preparation)
- Sheepsfoot or tramping-foot rollers (for soil compaction)
- Roller compactors
- Smooth drum compactors
- Water trucks
- Haul trucks (typically off-highway vehicles)
- Highway dump trucks
- Front-end loaders
- Truck-mounted cranes
- Lubricating and fueling trucks (supporting operation of construction equipment)
- Integrated tool carriers (supporting operation of construction equipment)
- Pickup trucks
- Generators
- Backhoes
- Truck-mounted augers
- Hydroseeding trucks
- Pile drivers
- Helicopters
- Barges
- Built-in cranes

2.1.4.3. Construction Activities

The following sections include a high-level summary of typical construction activities. Further details related to sideboards/protection measures for construction activities are provided in Section 2.1.5.2, *Programmatic General Protection Measures;* and in the specific protection measures referenced in the sections that follow.

Mobilization

Construction activities begin with a mobilization phase. This phase may involve installing temporary construction offices, setting up staging areas, and transporting equipment and materials to the work site.

Staging Areas

One or more staging areas are typically required for storage and distribution of construction materials and equipment. These areas are usually established in or near active construction areas and may be relocated as construction progresses, especially for long linear restoration projects. Staging areas typically include previously disturbed areas that provide parking for construction workers, and it may be necessary to acquire temporary easements from landowners. For further detail on staging area placement in relation to Covered Species, critical habitat, and aquatic areas see Water Quality Hazardous Materials (WQHM) Measure-1, *Staging Areas and Stockpiling of Materials and Equipment*.

Erosion Control

Erosion control may be a component of site restoration, or the goal of a restoration action. It may be conducted at any point in the project before, during, or after construction. Erosion control methods and treatments would be selected to be consistent with the erosion type anticipated at a site. This is generally considered a two-step process, including short-term erosion control followed by the establishment of vegetation for long-term soil stability. Further detail is provided in WQHM-1 through WQHM-3 and VHDR-3, *Revegetation Materials and Methods*. Erosion control may include grading, seeding, mulching, application of appropriate rolled erosion-control products, and soil bioengineering (brush layers, stakes, etc.). Typically, exposed soils are most vulnerable to erosion during the first rainy season following construction and require short-term erosion control. Short-term erosion control involves placement of erosion control products that will not trap wildlife (see WQHM-3, *Erosion Control Plans*), to provide immediate stabilization to underlying soil and reduce erosion until new vegetation can grow into the site. Over time, erosion control materials associated with temporary disturbance would either decompose or be manually removed.

Nonnative, Invasive Plant Control and Removal

Nonnative and/or invasive plant species control may be the goal of a restoration project (e.g., targeted removal of giant reed [*Arundo donax*]) or a component of site restoration and maintenance (see Vegetation/Habitat Disturbance and Revegetation (VHDR) protection measure 2, *Native and Invasive Vegetation Removal Materials and Methods)*. Methods may include use of herbicides, manual removal, mechanical removal, or strategic native plantings. Nonnative and/or invasive plant species control may occur prior to other restoration actions, to reduce the seed source prior to disturbance; during construction, in combination with grading or planting; or after construction, during maintenance of planted vegetation. The following herbicides are proposed for use under the Effort.

- **2,4-D amine.** 2,4-D amine acts as a growth-regulating hormone on broad-leaf plants, being absorbed by leaves, stems and roots, and accumulating in a plant's growing tips. If a Project Proponent uses 2,4 D amine, this action requires a 15-

foot buffer when hand applied, and a 50-foot buffer when it is applied using a backpack sprayer.

- **Aminopyralid**. This is a relatively new selective herbicide first registered for use in 2005. It is used to control broadleaf weeds and is from the same family of herbicides as clopyralid, picloram and triclpyr. Aminopyralid is proposed to be used for the selective control of broadleaf weeds. Acute toxicity tests show aminopyralid to be practically nontoxic, with aquatic invertebrates showing more sensitivity. Thus, if aminopyralid does end up in surface waters, the most likely pathway of effect for fish is through loss of prey.
- **Chlorsulfuron**. This herbicide is used to control broadleaf weeds and some annual grasses. Chlorsulfuron is readily absorbed from the soil by plants. This herbicide does not bioaccumulate in fish. The buffers and application methods greatly minimize the risk of exposure to listed fish and their prey species.
- **Clethodim**. Clethodim is a post emergence herbicide for control of annual and perennial grasses and is applied as a ground broadcast spray or as a spot or localized spray. This Program is not allowing it for broadcast application; it is allowed for hand application and backpack sprayer, both with a 50-foot buffer.
- **Clopyralid**. Clopyralid is a relatively new and very selective herbicide. It is toxic to some members of only three plant families. It is very effective against knapweeds, hawkweeds, and Canada thistle. Clopyralid does not bind tightly to soil, and thus would seem to have a high potential for leaching. That potential is functionally reduced by the relatively rapid degradation of clopyralid in soil. It is one of the few herbicides that this Proposed Restoration Effort program proposes to allow up to the waterline (for hand application) but requires a 100-foot buffer for broadcast application. The Proposed Restoration Effort only allows for one treatment per year.
- **Dicamba**. Dicamba is proposed to control broadleaf weeds, brush, and vines. Broadcast application of Dicamba will not be allowed for any project because of issues associated with drift. Leaves and roots absorb dicamba and it moves through the plant. It should be applied during active plant growth periods, with spot and basal bark periodic application during dormancy. It does not bind to soil particles and microbes appear to be the primary source of chemical breakdown in soil.
- **Glyphosate 1 (aquatic**). Glyphosate is a nonselective herbicide used to control grasses and herbaceous plants; it is the most commonly used herbicide in the world. It is moderately persistent in soil, with an estimated average half-life of 47 days (range of 1 to 174 days). Glyphosate is relatively nontoxic for fish. There is a low potential for the compound to build up in the tissues of aquatic invertebrates. The buffers and application methods greatly minimize the risk of exposure to fish and their prey species.
- **Imazapic**. Imazapic is used to control grasses, broadleaves, vines, and for turf height suppression in noncropland areas. Imazapic is proposed to be used for noxious weed control and rights-of-way management. Its use is proposed to be

allowed up to the waterline with hand injection methods, 15-foot buffers for backpack sprayer application, and 100-foot buffers for broadcast application.

- **Imazapyr**. Imazapyr is used to control a variety of grasses, broadleaf weeds, vines and brush species. The buffers and application methods greatly minimize the risk of exposure to fish and their prey species.
- **Metsulfuron-methyl**. The Escort formulation is proposed. It is used to control brush and certain woody plants, broadleaf weeds, and annual grasses. It is active in soil and is absorbed from the soil by plants.
- **Picloram**. This is a restricted-use pesticide labeled for noncropland forestry, rangeland, right-of-way, and roadside weed control. It is a growth inhibitor and is used to control a variety of broadleaf weed species. It is absorbed through the leaves and roots and accumulates in new growth. The use of this herbicide is restricted to hand applications only (no broadcast applications) with a 25+-foot buffer and no use on sandy or riverwash soils. The buffers and application methods greatly minimize the risk of exposure to fish and their prey species.
- **Sethoxydim**. This herbicide is a selective post-emergence pesticide for control of annual and perennial grasses. Its mode of action is lipid biosynthesis inhibition. Project design criteria and conservation measures sharply reduce the risk of exposure. A 50-foot no-application buffer is proposed for both spot spraying and hand application, and a 100- foot buffer for broadcast application. Other factors such as wind speed and weather also reduce the risk of exposure. Thus, the risk of acute or chronic exposure to sethoxydim is low.
- **Sulfometuron-methyl**. At proposed application rates, sulfometuron-methyl is highly toxic to seedlings of several broadleaves and grasses. No chronic exposure is anticipated to occur because the herbicide degrades relatively rapidly. Based on the proposed conservation measures, the risk of exposure to concentrations that result in acute lethal effects or chronic effects is low.
- **Triclopyr (TEA**). The environmental fate of triclopyr has been studied extensively. This formulation of triclopyr is not highly mobile, although soil adsorption decreases with decreasing organic matter and increasing pH. With the exception of aquatic plants, substantial risks to nontarget species (including humans) associated with the contamination of surface water are low relative to risks associated with contaminated vegetation. The buffers and application methods greatly minimize the risk of exposure to fish and their prey species.

Liquid or granular forms of herbicides to be applied by a licensed applicator as follows: (a) Broadcast spraying – hand held nozzles attached to back pack tanks or vehicles, or by using vehicle mounted booms; (b) spot spraying – hand held nozzles attached to back pack tanks or vehicles, hand-pumped spray, or squirt bottles to spray herbicide directly onto small patches or individual plants using; (c) hand/selective – wicking and wiping, basal bark, fill ("hack and squirt"), stem injection, cut-stump; (d) triclopyr – will not be applied by broadcast spraying.

As applicable, *Best Management Practices for Wildland Stewardship: Protecting Wildlife When Using Herbicides for Invasive Plant Management* (Cal-IPC 2015 or the most recent version) will be followed. If the guidance cannot be followed as applicable, then a project-specific Integrated Pest Management (IPM) Plan will be submitted with the ESA Section 7(a)(2) Review Form.

Access and Haul Routes

Access and haul routes are designated to haul materials to and from borrow sites, staging areas, and construction sites. Access routes are also used for employee commuting. These routes typically consist of existing public roads near construction sites; however, new off-road haul routes may also be constructed. Ingress and egress to the project site would depend on the complexity and scope of the project, and the characteristics of the project site.

Site Preparation

Site preparation typically involves clearing the ground of structures, woody vegetation, nonnative invasive plant species, and any debris. Structures to be cleared may consist of residences, agricultural outbuildings, irrigation facilities (distribution boxes, wells, standpipes, and pipes), power poles, utility lines, and piping. The clearing operation may be followed by grubbing operations to remove additional trees and other vegetation, stumps, root balls, and below ground infrastructure. In addition, earthen material from the ground may be stripped as part of site preparation. Site preparation may also include installation of a temporary water diversion or dewatering to minimize impacts to Covered Species.

Preparation of Borrow Sites

Borrow sites are prepared in a fashion similar to that used for construction sites. After structures and woody vegetation are cleared from the surface, stumps, root balls, and infrastructure are removed from below ground. Typically, the borrow area is then disked to chop any remaining surface vegetation and mix it with the near-surface organic soils. Next, the top layer of earthen material is stripped from the borrow excavation area, and this soil is stockpiled at the borrow site. Borrow is typically respread on the surface after the site has been graded, to support reclamation. Debris generated during the clearing and grubbing that is not suitable for inclusion in the stockpiled soil is disposed of as appropriate via various means (e.g., hauled off site to landfills, recycled, or sold for commercial use).

Excavation depths for borrow sites typically range in depth, depending on volume requirements, the quality and extent of material available, and the method of reclaiming the borrow site.

Site Restoration and Demobilization

When construction activities are complete, any material stripped from the soil surface during site preparation is placed on appropriate facilities (e.g., levees) and on any temporarily disturbed areas where topsoil was removed. Temporarily disturbed areas (as appropriate) are decompacted and then stabilized through promotion of revegetation with appropriate herbaceous native seed mixes or plantings of trees and shrubs, as appropriate to the site and restoration goals.

Temporarily disturbed areas are ones that can be recovered or restored to pre-project conditions so species recruitment is maintained. Irrigation, if necessary to allow planted woody species to become established, is installed at this time. Erosion control materials are also placed in areas where steep slopes are at risk of erosion during winter rain events; such materials include weed-free straw, biodegradable mesh netting, rock support, and/or bark mulch (further details on erosion control measures are provided in Section 2.1.5.2.2, Water Quality and Hazardous Materials). Any remaining construction debris is hauled to an appropriate waste facility.

Demobilization is likely to occur in various locations as construction proceeds through larger or linear restoration project areas.

Noncommercial borrow sites are restored or reclaimed by replacing topsoil that has been set aside and regraded to allow for continued uses such as farming; or for conversion to other uses, such as other restoration sites.

Disposal of Excess Materials

Excess material includes both construction-generated debris, such as concrete and demolition waste; and excess organic materials, such as woody vegetation, grasses, and roots from borrow areas and restoration construction sites. It also includes excavated material that does not meet levee embankment criteria; and soil not used or not suitable for the earthen structure under construction. Organic materials are typically used to reclaim borrow areas and temporarily disturbed sites and/or provided to local farmers for incorporation into their land to improve soil quality.

Debris generated during clearing and grubbing operations will be disposed of via various means, depending on the type of material and local conditions. Excess construction waste materials may be hauled off site to landfills (e.g., building demolition waste) or delivered to recycling facilities (e.g., concrete); excess organic materials may be sold (e.g., organic material to cogeneration facilities) or reused onsite. No excess materials generated during site preparation or other project activities will be disposed of by open burning.

Excess earthen materials (e.g., organic soils, vegetation, and excavated material) intended for on-site reuse may be temporarily stockpiled before being reused at the project site or used to reclaim borrow sites (Section 2.1.4.3, *Preparation of Borrow Sites*).

Maintenance and Monitoring Activities to Support Revegetation

Maintenance and monitoring activities necessary to support successful establishment may include temporary installation and use of irrigation systems and equipment; mechanical weed control, and weed control using herbicides (further details are provided in Section 2.1.5.2.4, *Herbicide Use*); control of invasive and other nonnative species, including predators and nuisance species; replanting and reseeding; fencing and signage; adjustments to grading or soils composition; and installation and operation of monitoring equipment, including but not limited to groundwater wells, flow gauges, depth gauges, cameras, unmanned aerial vehicles, and stakes. Activities may also include removal of temporary irrigation systems and equipment, temporary erosion control features, and temporary monitoring equipment once plants have become established, soils have been stabilized, and/or monitoring is complete, as appropriate. Temporary installations such as browse protection (e.g., protection from grazing animals such as deer), fencing, and signage may also be removed post-construction, as appropriate. The Project Proponent will describe the proposed maintenance and monitoring in the monitoring plan submitted with the ESA Section 7(a)(2) Review Form. The length of time these activities would continue is dependent on the circumstances of specific restoration projects and cannot be predicted at this time.

2.1.5. Protection Measures

The following GPMs will be incorporated, as applicable, into the project descriptions for individual projects authorized under the PBO. If a GPM does not apply at the project level, it will be indicated as such in the ESA Section 7(a)(2) Review Form. Not all GPMs may be appropriate or necessary to avoid and minimize impacts, depending on the scope, scale, and location of a project. Applicable measures should be determined by the Action Agency and the Project Proponent in coordination with the respective USFWS Field Office/S7 Delegated Authority Program when completing the ESA Section 7(a)(2) Review Form.

2.1.5.1. Self-Imposed Annual Take Limits

The Proposed Restoration Effort includes a series of sideboards under the criteria for eligible project types (Section 2.1.1 *Prohibited Activities,* and Section 2.1.3 *Eligible Project Types and Design Guidelines*); the administrative process for proposed restoration projects to be covered under the PBO (Section 2.1.2, *Administration of the PBO* and Figure 2); protection measures (Section 2.1.5, *Protection Measures),* and self-imposed limits for incidental take of animal species with an LAA determination.

For a restoration project to be covered under the PBO, it will have to meet the criteria outlined in this document. After the Lead Action Agency receives and reviews an ESA Section 7(a)(2) Review Form and finds it sufficient, it will be provided to the respective USFWS Field Office. The USFWS Field Office will implement its authority under Section 7 of the ESA to determine whether the proposed project will be appended to the PBO using the information provided in the ESA Section 7(a)(2) Review Form and any additional communication with the Lead Action Agency and/or Project Proponent and/or site visits (Figure 2). The self-imposed take limits for covered animal species are annual (January 1 through December 31) and range-wide. Once a take limit has been reached for a given covered animal species, this consultation is no longer available to cover proposed restoration projects that adversely affect that species, until the following year, starting January 1.

Due to the multiple sideboards in the administrative process and the Proposed Restoration Effort itself, potential take of Covered Species will be avoided and minimized while meeting restoration project goals, and as site conditions and technical constraints allow. Incidental take of a Covered Species may occur during project construction (i.e., mostly in the short term), but the overall goal of these restoration projects is to recover threatened and endangered species and their habitats, including critical habitat when designated. Potential short-term incidental take of Covered Species will be offset by the long-term beneficial effects to Covered Species from habitat restoration, habitat enhancement, and increased ecosystem services that further support the recovery of Covered Species.

As a part of the project description, the PBA incorporated into the Proposed Restoration Effort self-imposed limits on the amount of incidental take that will be authorized for the effort. The following incidental take described below for each covered animal species with an LAA determination provides a limit that will not be exceeded on an annual basis under the Effort.

Project Proponents will work with the respective USFWS Field Office during the ESA Section 7(a)(2) Review Form process to minimize take at the project level and avoid disproportionately affecting local populations. In some cases, proposed restoration projects may require independent consultation instead of programmatic coverage due to local effects being too great or if the project does not meet the intent of the Proposed Restoration Effort.

Once an individual take limit is reached, the Proposed Restoration Effort programmatic consultation is no longer available for proposed restoration projects that are expected to result in additional take of that individual species. However, the programmatic consultation will remain available for proposed restoration projects that do not need coverage for that particular species where the take limit was reached.

Table 4: Self-Imposed Annual Take Limits.

Common Name	Self-Imposed Annual Take Limits
Amphibians	
arroyo (arroyo southwestern) toad	No more than 10 adults or juveniles injured or killed; 5% of larval captures killed or injured; 2 egg strands damaged or destroyed annually.
California red-legged frog	No more than 60 terrestrial adults or juveniles injured or killed outside of the Sierra Nevada (shared between Field Offices), 5 terrestrial adults or juveniles injured or killed for locations within the Sierra Nevada; and 5% of larval captures injured or killed annually.
California tiger salamander – Central California DPS	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office; No more than 5% of larval captures injured or killed annually.
California tiger salamander – Santa Barbara County DPS	No more than 5 adults or juveniles injured or killed annually and no more than 5% of larval captures killed or injured per pond annually.
Foothill yellow-legged frog	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office. No more than 5% of larval captures injured or killed annually. Individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area.
mountain yellow-legged frog – northern California DPS	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office. No more than 5% of larval captures injured or killed annually. Individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area.
Santa Cruz long-toed salamander	No more than 5 adults or juveniles injured or killed annually. No more than 5% of larval captures killed or injured per pond annually.
Sierra Nevada yellow-legged frog	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office annually. No more than 5% of larval captures injured or killed annually. Individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area.
Yosemite toad	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office annually. No more than 5% of larval captures injured or killed annually. Individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area.

Common Name	Self-Imposed Annual Take Limits
Birds	
California least tern	No lethal take allowed. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a tern colony. No net loss of habitat through implementation of protection measures and/or offsetting impacts with habitat restoration or enhancement.
California clapper rail	Injury or mortality of no more than 1 individual annually. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
coastal California gnatcatcher	Injury or mortality of no more than 1 nest annually. Mortality to a nest would include disturbance to an active nest with egg(s) or chick(s) in the nest or if fledglings are still dependent on the nest for survival. Harm to no more than 2 individuals annually. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
least Bell's vireo	Injury or mortality of no more than 8 individuals and 4 nests annually. Mortality to a nest would include disturbance to an active nest with egg(s) or chick(s) in the nest or if fledglings are still dependent on the nest for survival. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of an occupied pairs' territory, except for restoration projects where the purpose is to remove non-native vegetation to improve least Bell's vireo habitat. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
light-footed Ridgway's rail	Harm to no more than 5% of a given population annually. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
marbled murrelet	Injury or mortality to no more than 1 nesting murrelet pair and their dependent young (1 egg/chick per annual clutch) per recovery unit annually.
northern spotted owl	No more than 18 nesting individuals harmed from disturbance annually.
western snowy plover – Pacific Coast population DPS	Death or injury of no more than 2 individuals annually per recovery unit. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of occupied plover habitat.
Fish	
Delta smelt	No more than 1 individual injured or killed annually. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
Lahontan cutthroat trout	No more than 20 NTUs 500 feet downstream of the project site or no more than 20% above background conditions, whichever is greater. No more than 3% of capture and relocations injured or killed.

Common Name	Self-Imposed Annual Take Limits
tidewater goby	No more than 10% of all individuals captured and relocated may be injured or killed per project.
unarmored threespine stickleback	No more than 2 individuals injured or killed per local population annually.
Invertebrate	
California freshwater shrimp	No more than 3% of captured and relocated individuals injured or killed per project.
Conservancy fairy shrimp	No more than 10% temporary habitat loss per occupied pool. This limit can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS FO, via the ESA Section 7(a)(2) Review Form Process.
longhorn fairy shrimp	No more than 10% temporary habitat loss per occupied pool. This limit can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS FO, via the ESA Section 7(a)(2) Review Form Process.
Mount Hermon June beetle	No more than 20 individuals injured or killed annually.
Riverside fairy shrimp	No more than 10% temporary habitat loss per occupied pool. This limit can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS FO, via the ESA Section 7(a)(2) Review Form Process.
San Diego fairy shrimp	No more than 10% temporary habitat loss per occupied pool. This limit can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS FO, via the ESA Section 7(a)(2) Review Form Process.
Smith's blue butterfly	No more than 25 host plants lost annually.
valley elderberry longhorn beetle	No more than 50 shrubs lost annually.
vernal pool fairy shrimp	No more than 10% temporary habitat loss per occupied pool. This limit can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS FO, via the ESA Section 7(a)(2) Review Form Process.
vernal pool tadpole shrimp	No more than 10% temporary habitat loss per occupied pool. This limit can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS FO, via the ESA Section 7(a)(2) Review Form Process.
Mammals	
riparian (San Joaquin Valley) woodrat	Injury or mortality of no more than 2 individuals annually. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a population in the project area.
riparian brush rabbit	Injury or mortality of no more than 2 individuals annually. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a population in the project area.

Common Name	Self-Imposed Annual Take Limits
salt marsh harvest mouse	Injury or mortality of no more than 2 individuals and 1 nest equivalent annually. 1 nest equivalent is equal to all young within the nest or 4 total juveniles if a nest is not found. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a population in the project area. No net loss of habitat through implementation of protection measures and/or offsetting impacts with habitat restoration or enhancement.
Reptiles	
Alameda whipsnake (striped racer)	Injury or mortality to no more than 4 adults or juveniles/hatchlings annually. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
giant garter snake	Injury or mortality to no more than 4 adults or juveniles/hatchlings annually. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
San Francisco garter snake	Injury or mortality to no more than 4 adults or juveniles/hatchlings annually. No permanent loss of hibernacula.

Notes:

Limits reset on January 1 each year. Limits apply to the entire range of the species (range-wide), unless otherwise indicated.

2.1.5.2. Programmatic General Protection Measures

Project Proponents should consider the following applicable GPMs; however, only relevant GPMs apply. Not all GPMs may be appropriate or necessary to avoid and minimize impacts, depending on the scope, scale, and location of a project. As described in Section 2.1.2 *Administration of the PBO*, alternative measures to accommodate site-specific conditions or technological constraints or advances may be proposed by Project Proponents, subject to approval by the USFWS Field Office (further detail is provided in Section 2.1.2.3, Submittal Requirements). GPMs are presented first, followed by protection measures focused on water quality and vegetation/habitat, and then measures focused on Covered Species. The following GPMs will be incorporated, as applicable, into the project descriptions for individual proposed restoration projects covered by the PBO. If a GPM is not applicable at the project level, it will be indicated as such in the ESA Section 7(a)(2) Review Form.

2.1.5.2.1. General Protection Measures

GPM-1, Receipt and Copies of All Permits and Authorizations. Work will not begin until all necessary permits and authorizations have been issued (e.g., USACE, USFWS, NMFS, State and/or Regional Boards, or CDFW). The Project Proponent will ensure that a readily available copy of the applicable agency permits and authorizations (e.g., USFWS PBO, NMFS PBO, or Section 404 permit) is maintained by the construction foreperson/manager on the project site for the duration of project activities.

GPM-2, Construction Work Windows. Construction work windows may be required, depending on whether the project involves in-water construction and/or whether Covered

Species have the potential to occur in the project area. Covered Species work windows are provided in Section 2.1.5.3, *Guild- and Species-Specific Protection* Measures.[4]

GPM-3, Construction Hours. Construction activities will generally be limited to daylight hours, to the extent practicable. If nighttime construction is necessary, including in tidally influenced waters where tides may limit daylight access and work schedules, all project lighting (e.g., staging areas, equipment storage sites, roadway, and construction footprint) will be selectively placed and directed onto the roadway or construction site and away from sensitive habitats. Light glare shields will be used to reduce the extent of illumination into sensitive habitats. If the work area is near surface waters, the lighting will be shielded so that it does not shine directly into the water.

GPM-4, Environmental Awareness Training. For projects occurring where Covered Species are likely to be present, prior to engaging existing or new personnel in construction activities, new construction personnel will participate in environmental awareness training conducted by a Qualified Biologist. Construction personnel will be informed regarding the identification, potential presence, habitat requirements, legal protections, avoidance and minimization measures, and applicable protection measures for Covered Species with the potential to occur in or immediately adjacent to the project site. Construction personnel will be informed of the procedures to follow should a Covered Species be encountered during construction activities. For projects where the Qualified Biologist is not regularly on the project site, training may be provided in an online/virtual meeting. For projects that may continue over an extended duration and require excessive training events, a training video developed under the supervision of the Qualified Biologist may be used to train new personnel, as long as a Qualified Biologist is available by phone to answer questions about the training or to answer questions that may arise during construction.

GPM-5, Environmental Monitoring. Where appropriate and based on project-specific requirements, a Qualified Biologist(s) will perform site clearance at the beginning of each day and will monitor construction activities throughout the day in, or immediately adjacent to, sensitive resources and/or Covered Species habitat (including critical habitat as applicable), as necessary. The Qualified Biologist will confirm that all applicable protection measures are implemented during project construction. The Qualified Biologist will have the authority to stop any work if they determine that any permit requirement is not fully implemented or if it is necessary to protect Covered Species, consistent with the information provided in a signed ESA Section 7(a)(2) Review Form by the USFWS Field Office to cover the proposed project by the PBO. The Qualified Biologist will prepare and maintain a biological monitoring log of construction site conditions and observations, which will be kept on file.

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[4] Extended or alternative work windows may be considered on an individual project basis with prior approval from USFWS ES, provided the Project Proponent can demonstrate that measures implemented to avoid or minimize exposure would do so at a level commensurate with the standard work windows.

GPM-6, Work Area and Speed Limits. Construction work and materials staging will be restricted to the smallest area practicable in designated work areas, routes, staging areas, temporary interior roads, or the limits of existing roadways. Prior to initiating construction or grading activities, brightly colored fencing or flagging or other practical means will be erected to demarcate the limits of the project activities, including the boundaries of designated staging areas; ingress and egress corridors; stockpile areas for spoils disposal, soil, and materials; and equipment exclusion zones. Flagging or fencing will be maintained in good repair for the duration of project activities. Posted speed limits on public roadways will be adhered to and speeds will be limited to 20 miles per hour (mph) in the project area on unpaved surfaces and unpaved roads (to reduce dust and soil erosion), or in areas where Covered Species have the potential to occur. Speeds greater than 20 mph may be permitted in the project area where Covered Species are not expected to occur (e.g., in areas where Covered Species have been excluded) and there is no risk of generating excessive dust (e.g., surfaces are paved, saturated, or have been treated with other measures to prevent dust). Additional details are provided in Section 2.1.5.3, *Guild- and Species-Specific Protection* Measures, where applicable. See also IWW-4, *In-Water Staging Areas and Use of Barges*.

GPM-7, Environmentally Sensitive Areas and/or Wildlife Exclusion. Where appropriate, fencing, flagging, or biological monitoring will be used to minimize disturbance to environmentally sensitive areas and Covered Species habitat. If the project site is suitable for fencing, prior to the start of construction, environmentally sensitive area fencing (ESAF) and/or Wildlife Exclusion Fencing (WEF) will be installed between the active work area(s) and any suitable terrestrial habitat where Covered Species could enter the site. When fencing is not practicable due to project size, topography, soils, or other factors, monitoring by a Qualified Biologist during construction activities can be used to minimize impacts (see GPM-5, *Environmental Monitoring*).

- The Qualified Biologist will determine the location of the ESAF and/or WEF prior to the start of construction.
- WEF specifications (e.g., height, installation requirement, or materials) will be determined based on the species the fencing is intended to exclude. ESAF does not require such specifications and may include flagging or monitoring (see GPM-5, Environmental Monitoring).
- The ESAF and/or WEF will remain in place throughout the duration of the construction activities and will be inspected and maintained regularly by the Qualified Biologist until completion of the project. Repairs to the ESAF and/or WEF will be made within 24 hours of discovery. The fencing will be removed only when all construction equipment is removed from the site, the area is cleared of debris and trash, and the area is returned to natural conditions.

GPM-8, Prevent Spread of Invasive Species. The spread or introduction of nonnative, invasive plant and animal species will be avoided. When practicable, nonnative invasive plants in the project areas will be removed and properly disposed of in a manner that will not promote their

spread. Equipment will be cleaned of any sediment or vegetation at designated wash stations before entering or leaving the project area, to avoid spreading pathogens or nonnative invasive species. Activities that create new habitat for nonnative invasive species will be avoided. Isolated infestations of nonnative invasive species identified in the project area will be treated with weed management methods at an appropriate time, to prevent further formation of seed and destroy viable plant parts and seed. Wash sites must be in confined areas that limit runoff to any surrounding habitat, and on a flat grade. Upland areas will use rice straw or invasive species-free local slash/mulch for erosion control; the remainder of the project area will use certified, weed-free erosion control materials. Mulch must be certified weed-free. The Project Proponent will follow the guidelines in the CDFW's California Aquatic Invasive Species Management Plan (CDFW 2008) and Aquatic Invasive Species Disinfection/Decontamination Protocols (CDFW 2016). Construction supervisors and managers will be educated on weed identification and the importance of controlling and preventing the spread of invasive weeds.

GPM-9, Practices to Prevent Pathogen Contamination. The Project Proponent will review and implement restoration design considerations and best management practices (BMPs) to help prevent pathogen contamination, as published by the "Working Group for *Phytophthoras* in Native Habitats" (www.calphytos.org), when there is a risk of introduction and spread of plant pathogens in site plantings. The Project Proponent will review and implement decontamination protocols to prevent the spread of pathogens among amphibians or other aquatic animals when working in aquatic habitats that may support native amphibians. Gear and equipment that may contact water will be cleaned and decontaminated to prevent the spread of chytrid fungus, following protocols in Aquatic Invasive Species Disinfection/Decontamination Protocols (CDFW 2016, or latest version). For additional guidance related to amphibians and chytrid fungus, see AMP-4 and AMP-10.

GPM-10, Equipment Maintenance and Materials Storage. Vehicle traffic will be confined to existing roads and the proposed access route(s). All machinery must be in good working condition, showing no signs of fuel or oil leaks. Oil, grease, or other fluids will be washed off at designated wash stations prior to entering the construction site. Inspection and evaluation for the potential for fluid leakage will be performed daily during construction. All fuel and chemical storage, servicing, and refueling will be done in an upland staging area or other suitable location (e.g., barges) with secondary containment to prevent spills from traveling to surface water or drains. Project Proponents will establish staging areas for equipment storage and maintenance, construction materials, fuels, lubricants, solvents, and other possible contaminants in coordination with resource agencies. Staging areas will have a stabilized entrance and exit and will be at least 100 feet from waterbodies, unless site-specific circumstances do not provide such a setback; in such cases, the maximum setback possible will be used. Fluids will be stored in appropriate containers with covers and will be properly recycled or disposed of off-site. Machinery stored on site will have pans or absorbent mats placed underneath potential leak areas.

GPM-11, Material Disposal. All refuse, debris, unused materials, and supplies that cannot reasonably be secured will be removed daily from the project work area and deposited at an

appropriate disposal or storage site. All construction debris will be removed from the work area immediately on project completion. The Water Quality and Hazardous Materials (Section 2.1.5.2, *Water Quality and Hazardous Materials*) measures will be implemented to ensure proper handling and disposal of hazardous materials.

GPM-12, Fugitive Dust Reduction. To reduce dust, construction vehicles will be speed-restricted as described in GPM-6, *Work Area and Speed Limits*, when traveling on nonpaved surfaces. Stockpiled materials susceptible to wind-blown dispersal will be covered with plastic sheeting or other suitable material to prevent movement of the material. During construction, water (e.g., trucks, and portable pumps with hoses) or other approved methods will be used to control fugitive dust. Dust suppression activities must not result in a discharge to waterbodies.

GPM-13, Trash Removed Daily. During project activities all trash, especially food-related refuse that may attract potential predators or scavengers, will be properly contained in sealed containers, removed from the work site, and disposed of daily.

GPM14, Project Cleanup after Completion. Work pads, temporary falsework, and other construction items will be removed from the 100-year floodplain by the end of the construction window. Removal of materials must not result in discharge to waterbodies.

GPM-15, Revegetate Disturbed Areas. All temporarily disturbed areas will be decompacted and seeded/planted with an assemblage of native riparian, wetland, and/or upland plant species suitable for the area. The Project Proponent will develop a revegetation plan. Plants for revegetation will come primarily from active seeding and planting, or from natural recruitment where applicable. Plants imported to the restoration areas will come from local stock. Only native plants (genera) will be used for restoration efforts. Certified weed-free native mixes and mulch will be used for any restoration planting or seeding. Revegetation activities in and adjacent to waterbodies and other aquatic habitat suitable for Covered Species will commence after construction activities at a site are complete.

GPM-16, Wildfire Prevention. With the exception of vegetation-clearing equipment, no vehicles or construction equipment will be operated in areas of tall, dry vegetation. A fire prevention and suppression plan will be developed and implemented for all maintenance and repair activities that require welding or otherwise have a risk of starting a wildfire.

2.1.5.2.2. Water Quality and Hazardous Materials

The following protection measures for water quality and hazardous materials should be considered for projects that meet the activity criteria identified in each measure, and appropriate protection measures should be proposed as part of the ESA Section 7(a)(2) Review Form. The following sections include protection measures to address staging and stockpiling materials, erosion and sedimentation, potentially hazardous materials, in-water work, dewatering and species relocation, pile driving and pile replacement, and dredging operations (including dredging material reuse).

Staging and Stockpiling of Materials

WQHM-1, Staging Areas and Stockpiling of Materials and Equipment. Staging, storage, and stockpile areas must be outside of habitat suitable for Covered Species unless necessary for project implementation and approved by the Action Agency and the USFWS Field Office. Where feasible, staging will occur on access roads or other previously disturbed upland areas, such as developed areas, paved areas, parking lots, areas with bare ground or gravel, and areas clear of vegetation, to avoid sensitive habitats and limit disturbance to surrounding habitats. Similarly, all maintenance equipment and materials (e.g., road rock and project spoil) will be restricted to the existing service roads, paved roads, or other determined designated staging areas. See GPM-10, *Equipment Maintenance and Materials Storage*, for more details regarding protection measures for materials storage.

Staging areas will be established for equipment storage and maintenance, construction materials, fuels, lubricants, solvents, and other possible contaminants. Staging areas will have a stabilized entrance and exit and will be at least 100 feet from bodies of water, unless site-specific circumstances do not provide such a setback; in such cases, the maximum setback possible will be used. See also IWW-2, *In-Water Vehicle Selection and Work Access*; and IWW-4, *In-Water Staging Areas and Use of Barges.* If an off-road staging area is chosen and if Covered Species are potentially present, the Qualified Biologist will survey the selected site to verify that no sensitive resources would be disturbed by staging activities.

Stockpiling of materials, portable equipment, vehicles, and supplies (e.g., chemicals), will be restricted to the designated construction staging areas. If rain is predicted in the forecast during the dry season, and stockpiled soils will remain exposed and unworked for more than 7 days, then erosion and sediment control measures must be used. If there is a high-wind scenario, then soils will be covered at all times. During the wet season, no stockpiled soils will remain exposed, unless properly installed and maintained erosion controls are in place on and around the stockpile. Temporary stockpiling of material onsite will be minimized. Stockpiled material will be placed in upland areas far enough away from Covered Species habitat that these materials cannot discharge to waters of the United States. Additional species-specific erosion control measures may also be necessary because of the potential for listed species at the project site. More detail is provided in Section 2.1.5.3, *Guild and Species-Specific Protection Measures*.

Erosion and Sedimentation Control Measures

WQHM-2, Storm Water Pollution Prevention Plan. All projects that are required to obtain coverage under the NPDES General Order for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Order) will prepare and implement a site-specific storm water pollution prevention plan (SWPPP), as required by the Construction General Order.

WQHM-3, Erosion Control Plans. For projects that do not require coverage under an NPDES permit per WQHM-2, the Project Proponent will include appropriate BMPs, and a rain even action plan if seasonal rain during the construction period might occur, to reduce the potential

release of water quality pollutants to receiving waters. BMPs may include the following measures:

- Install erosion control measures, such as straw bales, silt fences, fiber rolls, or equally effective measures, at riparian areas adjacent to stream channels, drainage canals, and wetlands, as needed. Erosion control measures will be monitored during and after each storm event for effectiveness. Modifications, repairs, and improvements to erosion control measures will be made as needed to protect water quality.
- Erosion control products that include synthetic or plastic monofilament or cross-joints in the netting that are bound/stitched (e.g., straw wattles, fiber rolls, or erosion control blankets) and could trap snakes, amphibians, and other wildlife will not be used.

Other Water Quality Measures

WQHM-4, Hazardous Materials Management and Spill Response. As part of the SWPPP or Erosion Control Plan (see WQHM-2 and WQHM-3), the Project Proponent will prepare and implement a hazardous materials management and spill response plan. The Project Proponent will ensure that any hazardous materials are stored at the staging area(s) with an impermeable membrane between the ground and hazardous material, and that the staging area is designed to prevent the discharge of pollutants to groundwater and runoff water. The Project Proponent will use and store hazardous materials, such as vehicle fuels and lubricants, in designated staging areas away from stream channels and wetlands, unless otherwise approved in the ESA Section 7(a)(2) Review Form, according to local, state, and federal regulations. The Project Proponent will notify regulatory agencies within 24 hours of any leaks or spills and will properly contain and dispose of any unused or leftover hazardous products off site. Also see GPM-10, *Equipment Maintenance and Materials Storage*, for more detail on spill prevention.

WQHM-5, In-Water Concrete Use. Poured concrete will be excluded from contact with surface or groundwater during initial curing, ideally for 30 days after it is poured. During that time, runoff from the concrete will not be allowed to enter surface or groundwater. If this is not feasible due to expected flows and site conditions, commercial sealants that are appropriate for use near water may be applied before the sealant comes into contact with flowing water. If sealant is used, water will be excluded from the site until the sealant is dry and fully cured, according to the manufacturer's specifications. Concrete is considered to be cured when water poured over the surface of concrete consistently has a pH of less than 8.5. More information regarding excluding water from a site is provided in Section 2.1.5.2.2, *Dewatering Activities and Aquatic Species Relocation*.

General In-Water Measures

IWW-1, Appropriate In-Water Materials. Selection and use of gravels, cobble, boulders, and instream woody materials in streams, and other materials (e.g., oyster shells, other substrates) for reef/bed restoration will be performed to avoid and/or minimize adverse impacts to aquatic Covered Species and their habitats. On-site gravels will be screened and sorted; Gravels imported from a commercial source will be clean-washed and of appropriate size. As necessary

to protect Covered Species, placement will be overseen by a Qualified Biologist; implementation timing will be determined based on the least amount of overlap (or impact on) all sensitive biological resources that may be affected, and the timing of their use of the receiving area. Imported gravel from outside the project watershed will not be from a source known to contain historical hydraulic gold mine tailings, dredger tailings, or mercury mine waste or tailings. Materials that may foul or degrade spawning gravels (e.g., sand or soil eroding from sandbag or earthen dams) will be managed to avoid release and exposure in salmonid streams. Oyster shells or other substrates for reef/bed restoration will be cured and inspected to be free of pathogens and/or nonnative species.

IWW-2, In-Water Vehicle Selection and Work Access. If work requires that equipment enter wetlands or below the banks of a Water of the US, equipment with low ground pressure will be used to minimize soil compaction. Low-ground-pressure heavy equipment mats will be used, if needed to lessen soil compaction. Hydraulic fluids in mechanical equipment working in the waters of the United States or any other aquatic habitat suitable for Covered Species will not contain organophosphate esters. The amount of time this equipment is stationed, working, or traveling in the waters of the United States or other aquatic habitat suitable for Covered Species will be minimized. All equipment will be removed from the aquatic feature during nonwork hours or returned to the staging area approved through the ESA Section 7(a)(2) Review Form process in the aquatic feature.

IWW3, In-Water Placement of Materials, Structures, and Operation of Equipment. Material used for bank stabilization or in-water restoration will minimize discharge sediment or other forms of waste to waters of the United States or other aquatic habitat suitable for Covered Species. Construction will occur from the top of the stream bank, on a ground protection mat underlain with filter fabric, or a barge. All materials placed in streams, rivers, or other waters will be nontoxic. Any combination of wood, plastic, cured concrete, steel pilings, or other materials used for in-channel structures will not contain coatings or treatments, or consist of substances toxic to aquatic organisms (e.g., zinc, arsenic, creosote, copper, other metals, pesticides, or petroleum-based products) that may leach into the surrounding environment in amounts harmful to aquatic organisms. Except for the following conditions, equipment must not be operated in standing or flowing waters without site-specific approval from the USFWS Field Office:

- All construction activities must be effectively isolated from water flows, to minimize the potential for runoff. This may be accomplished by working in the dry season or dewatering the work area in the wet season.
- When work in standing or flowing water is required, structures for isolating the in-water work area and/or diverting the water flow must not be removed until all disturbed areas are cleaned and stabilized. The diverted water flow must not be contaminated by construction activities.
- All open-flow temporary diversion channels must be lined with filter fabric or other appropriate liner material to prevent erosion. Structures used to isolate the in-water work area

and/or divert the water flow (e.g., cofferdam or geotextile silt curtain) must not be removed until all disturbed areas are stabilized.

IWW-4, In-Water Staging Areas and Use of Barges. Where appropriate and practical, barges will be used to stage equipment and construct the project, to reduce noise, traffic disturbances, and effects on terrestrial vegetation. When barge use is not practical, construction equipment and plant materials will be staged in staging areas approved through the ESA Section 7(a)(2) Review Form process. Existing staging sites, maintenance toe roads, and crown roads will be used for project staging and access to avoid affecting previously undisturbed areas. For projects that involve in-water work for which boats and/or temporary floating work platforms are necessary, buoys will be installed so that moored vessels will not beach on the shoreline and anchor lines will not drag. Moored vessels and buoys will not be within 25 feet of vegetated shallow waters.

Dewatering Activities and Aquatic Species Relocation

This section includes GPMs for dewatering activities and species relocation. Measure IWW-5 provides the framework for a capture and relocation plan in general terms. Details on specific aquatic species rescue and relocation are described in the specific Species Protection Measures.

IWW-5, Cofferdam Construction. Cofferdams may be installed both upstream and downstream, and along portions of the cross section of a channel or other waterway, if necessary to isolate the extent of the work areas. Construction of cofferdams will begin in the upstream area and continue in a downstream direction, enabling water to drain and allowing fish and aquatic wildlife species to leave (under their own volition) the area being isolated by the cofferdam, prior to closure. The flow will then be diverted only when construction of the upstream dam (if necessary) is completed and the work area has been naturally drained of flow; at this point, the downstream dam (if necessary) would be completed, and flow would be diverted around the work area. Cofferdams and stream diversion systems will remain in place and fully functional throughout the construction period. To minimize adverse effects to Covered Species, stream diversions will be limited to the shortest duration necessary to complete in-water work. In-water cofferdams will only be built from materials such as sandbags, clean gravel, rubber bladders, vinyl, steel, or earthen fill, and will be built in a manner that minimizes siltation and/or turbidity. Cofferdams will be pushed into place. If pile driving (sheet piles) is required, vibratory hammers will be used, and impact hammers will be avoided. If necessary, the footing of the cofferdam will be keyed into the channel bed at an appropriate depth to capture the majority of subsurface flow needed to dewater the streambed. When cofferdams with bypass pipes are installed, debris racks will be placed at the bypass pipe inlet in a manner that minimizes the potential for fish impingement and/or entrapment. Bypass pipes will be monitored for accumulation of debris, and accumulated debris will be removed. When appropriate, cofferdams will be removed so that surface elevations of water impounded above the cofferdam will not be reduced at a rate greater than 1 inch per hour. Cofferdams in tidal waters will be removed during the lowest possible tide and in slack water to minimize disturbance and turbidity. This will minimize the probability of fish and other aquatic species stranding as the area upstream becomes dewatered. All dewatering/diversion facilities will be

installed so that natural flow is maintained upstream and downstream of project areas. An area may need to be dewatered long enough to allow Covered Species to leave on their own before final clearance surveys and construction can begin.

IWW6, Dewatering/Diversion. The area to be dewatered will encompass the minimum area necessary to perform construction activities. The Project Proponent will provide a dewatering plan with a description of the proposed dewatering structures and appropriate BMPs for the installation, operation, maintenance, and removal of those structures. The period of dewatering/diversion will extend only for the minimum amount of time needed to perform the restoration activity and to allow Covered Species time to leave on their own before final clearance surveys and construction can begin. Dewatering/diversion will occur via gravity-driven systems, where feasible and except as specified below. Dewatering/diversion will be designed to avoid direct and preventable indirect mortality of fish and other aquatic species. If Covered Fish Species may be present in the area to be dewatered, a fish capture and relocation plan will be developed and implemented for review and approval by the appropriate agencies. Stream flows will be allowed to gravity flow around or through the work site, using temporary bypass pipes or culverts. Bypass pipes will be sized to accommodate a minimum of twice the expected construction-period flow and not increase stream velocity and will be placed at stream grade. Conveyance pipe outlet energy dissipaters will be installed to prevent scour and turbidity at the discharge location.

When gravity-fed dewatering is not feasible and pumping is necessary to dewater a work site, a temporary siltation basin and/or silt bags may be required to prevent sediment from reentering the wetted channel. Silt fences or mechanisms to avoid sediment input to the flowing channel will be installed adjacent to flowing water. Water pumped or removed from dewatered areas will be conducted in a manner that does not contribute turbidity to nearby receiving waters. Pumps will be refueled in an area well away from the stream channel. Fuel-absorbent mats will be placed under the pumps while refueling. Equipment working in the stream channel or within 25 feet of a wetted channel will have a double (i.e., primary and secondary) containment system for diesel and oil fluids.

All work will comply with the CDFW Fish Screening Criteria (CDFW 2001) or NMFS Fish Screening Criteria for Anadromous Salmonids (NOAA 2022). Pump intakes will be covered with mesh, in accordance with the requirements of current fish screening criteria, to prevent potential entrainment of fish or other aquatic species that could not be removed from the area to be dewatered. The pump intake will be checked periodically for impingement of fish or other aquatic species. Diverted flows must be of sufficient quality and quantity, and of appropriate temperature, to support existing fish and other aquatic life both above and below the diversion. Pre-project flows must be restored to the affected surface waterbody on completion of work at that location. Where diversions are planned, contingency plans will be developed that include oversight for breakdowns, fueling, maintenance, leaks, etc.

IWW-7, Fish and Aquatic Species Exclusion While Installing Diversion Structures. Fish and other aquatic species will be excluded from occupying the area to be dewatered by blocking the stream channel above and below with fine-meshed block nets or screens, based on the site

conditions, while cofferdams and other diversion structures are being installed. Block net mesh will be sized to ensure that aquatic species upstream or downstream do not enter the areas proposed for dewatering. Mesh will be no greater than 1/8-inch diameter. The bottom of the net must be completely secured to the channel bed. Block nets or screens must be checked at least twice daily at the beginning and end of the workday and cleaned of debris to permit free flow of water. Block nets or screens will be placed and maintained throughout the dewatering period at the upper and lower extent of the areas where aquatic species will be removed. Net placement is temporary and will be removed once dewatering has been accomplished, or construction work is complete for the day.

Pump intakes will be covered with mesh, in accordance with the requirements of current NMFS fish screening criteria, to prevent potential entrainment of fish or other aquatic species that could not be removed from the area to be dewatered. The pump intake will be checked periodically for impingement of fish or other aquatic species. All work will comply with the CDFW Fish Screening Criteria (CDFW 2001) or NMFS Fish Screening Criteria for Anadromous Salmonids (NOAA 2022).

IWW-8, Removal of Diversion and Barriers to Flow. On 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; any imported material that is not part of the project design will be removed from stream beds on completion of the project.

In-Water Pile Driving and Pile Replacement

IWW-9, In-Water Pile Driving Plan for Sound Exposure. Project Proponents will develop a plan for pile-driving activities to minimize impacts to Covered Species and submit it for USFWS Field Office review and approval as part of the ESA Section 7(a)(2) Review Form review process (Section 2.1.2, *Administration of the PBO*). Measures will be implemented to minimize underwater sound pressure to levels below fish thresholds for peak pressure and accumulated sound exposure levels. Threshold levels established in *Fisheries Acoustic Work Group's Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities* (FHWG 2008) can be used as a guideline for the protection of Covered Species. The plan will describe the method that is least impactful to aquatic organisms, and will identify the number, type, and size of piles; estimated sound levels caused by the driving; number of piles driven each day; qualifications of monitors; any other relevant details on the nature of the pile-driving activity; and the actions that will be taken to ensure that a project stays within the required sound exposure thresholds.

IWW-10, In-Water Pile Driving Methods. Pile driving will occur during approved work windows, with reduced currents, and only during daylight hours. Pile driving will be conducted with vibratory or low/nonimpact methods (i.e., hydraulic) that result in sound pressures below threshold levels. Applied energy and frequency will be gradually increased until necessary full force and frequency are achieved. If it is determined that impact hammers are required and/or underwater sound monitoring demonstrates that thresholds are being exceeded, the contractor will implement sound dampening or attenuation devices to minimize sound levels; these may include:

- A cushioning block used between the hammer and pile
- A confined or unconfined air bubble curtain
- If site conditions allow, pile driving in the dry area (dewatered) behind the cofferdam

Pile driving will follow the criteria outlined in the most recent version of the California Department of Transportation's *Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish* (Caltrans 2015).

IWW-11, Sediment Containment During In-Water Pile Driving. A continuous length of silt curtain, fully surrounding the pile-driving area and installed close to piers, will be used to protect aquatic resources and provide sediment containment while construction activities are occurring if working in a wetted channel. The silt curtain will prevent the release of a turbidity plume and trap sediment that may become suspended as a result of the pile driving. The bottom of the silt curtains must be weighted (e.g., with ballast weights or rods affixed to the base of the fabric) to resist the natural buoyancy of the silt curtain fabric and lessen its tendency to move in response to currents. Floating silt curtains will be anchored and deployed from the surface of the water to just above the substrate. The silt curtain will be monitored for damage, dislocation, or gaps and will be immediately repaired where it is no longer continuous or where it has loosened. The silt curtain must restrict the surface visible turbidity plume to the area of pile construction and must control and contain the migration of resuspended sediments at the water surface and at depth.

These IWW-11 measures may be waived or modified by the USFWS Field Office when pile driving involves only non-self-propelled, hand-driven methods (e.g., using a hand-held manual or pneumatic pounder) and commensurate small diameter pile material (e.g., nontreated tree stakes less than 5 inches in diameter).

IWW-12, Pile-Driving Monitoring. A Qualified Biologist will be on site during pile-driving activities to minimize effects to Covered Species. If any stranding, injury, or mortality to Covered Species is observed, the USFWS Field Office will be notified in writing (e.g., via email) within 24 hours and in-water pile driving will cease until the USFWS Field Office provides guidance on how to proceed.

Dredging Operations and Dredge Materials Reuse

IWW-13, Dredging Operations and Dredging Materials Reuse Plan. The Project Proponent will develop and implement a dredging operations and dredging materials management plan to

minimize the effects that could occur during dredging operations and material reuse and disposal. If material is being imported from off site or if there are specific concerns about residual contaminants in the soil from historical land use activities (which can be determined on a site-specific basis), the plan will describe a sampling program for conducting physical and chemical analyses of sediments before import and/or disturbance. It will also describe BMPs to be implemented during dredging operations (e.g., using less intrusive dredging procedures, properly containing dredging spoils and water, using silt curtains, using methods to minimize turbidity, and timing dredging activity to coincide with low flows). The plan will also describe methods to evaluate the suitability of dredged material for reuse and disposal.

2.1.5.2.3. Vegetation/Habitat Disturbance

The following protection measures for vegetation disturbance should be considered for projects that meet activity criteria identified in each measure.

VHDR-1, Avoidance of Vegetation Disturbance. The Project Proponent will minimize the amount of soil, terrestrial vegetation, emergent vegetation, and submerged vegetation (e.g., eelgrass and kelp in marine areas, or submerged aquatic vegetation in freshwater areas) disturbed during project construction and completion by using methods creating the least disturbance to vegetation. Disturbance to existing grades and native vegetation, the number of access routes, the size of staging areas, and the total area disturbed by the project will be limited to the extent of all temporary and permanent impacts, as defined by the final project design. All roads, staging areas, and other facilities will be placed to avoid and limit disturbance to aquatic habitat suitable for Covered Species (e.g., streambank or stream channel, and riparian habitat). Existing ingress or egress points will be used and/or work will be performed either from the top of the banks, from barges on the waterside of the stream or levee bank, or from dry gravel beds. Existing native vegetation will be retained as practicable, emphasizing the retention of shade-producing and bank-stabilizing trees and brush with greater than 6-inch-diameter branches or trunks. Vegetation disturbance and soil compaction will be minimized by using low-ground-pressure equipment that has a greater reach than or exerts less pressure per square inch on the ground than other equipment.

VHDR-2, Native and Invasive Vegetation Removal Materials and Methods. All invasive plant species (e.g., those rated as invasive by the Cal-IPC, or local problem species) will be removed from the project site as practicable, using locally and routinely accepted management practices. Invasive plant material will be destroyed using approved protocols and disposed of at an appropriate upland disposal or compost area. Invasive plant materials stockpiled at sites known to experience flash flooding outside the flood season will be removed within 15 days of the initial creation of the stockpile, to contain the potential spread of invasive plant material. Stockpiling of invasive plant materials is prohibited during the flood season (typically November to April).

Nonnative Plant Removal

1. When practicable, nonnative plants will be removed when flowers or seeds are not present. If flowers or seeds are present and have the potential for seed to be widely dispersed during removal (e.g., Spanish broom [*Spartium junceum*] and eupatory [*Ageratina adenophora*]), the flowering head will be removed and placed in a container for disposal prior to removal.
2. Whenever practicable, nontarget vegetation will be protected in order to minimize the creation of exposed ground and potential for re-colonization of nonnative plants. A botanist will be consulted prior to any restoration implementation and during preparation of restoration plans.
3. Where appropriate, barriers will be installed to limit illegal off-highway vehicle activity following removal of nonnative vegetation along roadways. Examples of barriers are large rocks, soil berms, and cut vegetation.

   To the extent practicable, crews in known or assumed[5] occupied habitat for Covered Species will minimize multiple stream crossings for nonnative plant removal from both streambanks simultaneously (e.g., during a work period, an individual will conduct activities along one streambank for the entire stretch before initiating activities on the opposing bank). Stream crossings will use existing features such as bridges and boulders to avoid boots in the water, as much as feasible.

VHDR-3, Revegetation Materials and Methods. On completion of work, site contours will be returned to preconstruction conditions or designed to provide increased biological and hydrological functions. Where disturbed, topsoil will be conserved for reuse during restoration, to the extent practicable. Native plant species comprising a diverse community structure (plantings of both woody and herbaceous species, if both are present) that follow a plant species palette approved through the ESA Section 7(a)(2) Review Form process will be used for revegetation of disturbed and compacted areas, as appropriate. See also GPM-15: Revegetate Disturbed Areas, which also allows for revegetation through natural recruitment (e.g., in tidal and managed wetlands and working landscapes where disturbed areas typically revegetate more quickly through natural recruitment than through seeding).

Any area barren of vegetation as a result of project implementation will be restored to a natural state by mulching, seeding, planting, or other means, with native trees, shrubs, willow stakes, erosion control native grass seed mixes, or herbaceous plant species, following completion of project construction. Restoration planning for these areas should include steps to prevent colonization by nonnative species, including recolonization by any nonnative plant species that occupied the site prior to project implementation. Irrigation may also be required to ensure survival of containerized shrubs or trees or other vegetation, depending on rainfall. If irrigation is

[5] Habitat will be assumed occupied when suitable habitat is present within the current range of the species and their absence has not been determined by a negative finding using protocol level surveys.

used, all irrigation materials will be removed once no longer needed. Soils that have been compacted by heavy equipment will be decompacted by shallow or deep ripping, if necessary to allow for revegetation at project completion as heavy equipment exits the construction area.

VHDR4, Revegetation Erosion Control Materials and Methods. If erosion control fabrics are used in revegetated areas, they will be slit in appropriate locations to allow for plant root growth. Only non-monofilament, wildlife-safe fabrics will be used. All exclusion netting/caging placed around plantings will be removed after 2 years or sooner.

VHDR-5, Revegetation Monitoring and Reporting. All revegetated areas will be maintained and monitored for a minimum of 2 years after replanting is complete, or until success criteria are met, to ensure that the revegetation effort is successful. The standard for success is 60% cover compared to pre-project conditions at the project site or at least 60% cover compared to an intact, local reference site. If an appropriate reference site or pre-project conditions cannot be identified, success criteria will be developed for review and approval on a project-by-project basis, based on the specific habitat impacted and known recovery times for that habitat and geography. The Project Proponent will prepare a summary report of the monitoring results and recommendations on December 1 each year. The report will be provided to the respective USFWS Field Office (copy the Lead Action Agency).

2.1.5.2.4. Herbicide Use

The following protection measures may be relevant to projects where herbicide application is anticipated as a project activity.

VHDR-6, General Herbicide Use. Chemical control of invasive plants and animals will only be used when other methods are determined to be ineffective or would create greater environmental impacts than chemical control**.** Herbicide use will be evaluated on a project-by-project basis, with consideration of (and preference given toward) IPM strategies wherever possible. See University of California statewide IPM Program for guidance documents (http://ipm.ucanr.edu/index.html). Broadcast spraying, including the use of aerial drones, may be used if it provides greater application accuracy and access. Any chemical considered for control of invasive species must be approved for use in California; its application must adhere to all regulations, in accordance with the California Environmental Protection Agency (CEPA 2011 or most recent version); and it must be applied by a licensed applicator under all necessary state and local permits. Herbicides will be used only in a context where all treatments are considered, and various methods are used individually or in concert to maximize the benefits while reducing undesirable effects and applying the lowest legal effective application rate, unless site-specific analysis determines that a lower rate is needed to reduce nontarget impacts. Only the minimum area necessary for effective control will be treated. Whenever feasible, reduce vegetation biomass by mowing, cutting, or grubbing it before applying herbicide to reduce the amount of herbicide needed. Within 25 feet of any Water of the US, only formulations approved by the United States Environmental Protection Agency for aquatic use will be used. Soil-activated herbicides can be applied as long as directions on the label are followed.

To limit the opportunity for surface water contamination with herbicide use, all projects will have a minimum buffer for ground-based broadcast application of 100 feet, and the minimum buffer with a backpack sprayer is 15 feet (aerial application is not included in the Proposed Action).

The licensed Applicator will follow recommendations for all California restrictions, including wind speed, rainfall, temperature inversion, and ground moisture for each herbicide used. In addition, herbicides will not be applied when rain is forecast to occur within 24 hours, or during a rain event or other adverse weather conditions (e.g., snow, fog).

Herbicide adjuvants are limited to water or nontoxic or practically nontoxic vegetable oils and agriculturally registered, food grade colorants (e.g., Dynamark U.V. [red or blue], Aquamark blue, or Hi-Light blue) to be used to detect drift or other unintended exposure to waterways.

Any herbicides will be transported to and from the worksite in tightly sealed waterproof carrying containers. The licensed Applicator will carry a spill cleanup kit. Should a spill occur, people will be kept away from affected areas until clean-up is complete. Herbicides will be mixed more than 150 feet, as practicable, from any water of the state to minimize the risk of an accidental discharge. Impervious material will be placed beneath mixing areas in such a manner as to contain any spills associated with mixing/refilling.

VHDR-7, Herbicide Application Planning. Written chemical application, monitoring, and reporting prescriptions will be provided to each Project Proponent from a certified Pest Control Advisor (PCA) (CEPA 2011). The PCA will ensure that legal, appropriate, and effective chemicals are used, with appropriate methodologies. Field scouting must be done before application; the licensed Applicator (CEPA 2011) must be on site to lead all applications and will adhere to the PCA prescription and standard protection measures for application. Prior to field scouting or application, the PCA should receive Environmental Awareness Training (see GPM-4, Environmental Awareness Training) for the project so that they are aware of Covered Species and habitats present at the project site. The PCA monitoring prescription should address timing necessary to evaluate and report target species efficacy as well as any nontarget plant and animal effects. As applicable, Best Management Practices for Wildland Stewardship: Protecting Wildlife When Using Herbicides for Invasive Plant Management (Cal-IPC 2015 or the most recent version) will be followed. If the guidance cannot be followed as applicable, then a project specific IPM Plan will also be submitted with the ESA Section 7(a)(2) Review Form.

VHDR-8, Herbicide Application Reporting. The licensed applicator will keep a record of all plants/areas treated; amounts and types of herbicides used; and dates of application as well as other monitoring elements prescribed by the PCA in VHDR-7; pesticide application reports must be completed within 24 hours of application and submitted to the applicable agencies for review. Wind and other weather data will be monitored and reported for all application reports.

Below is a description of the known toxicity of herbicides proposed for use under this programmatic. If other herbicides are proposed for use by a Project Proponent, a complete effects analysis must be submitted along with the ESA Section 7(a)(2) Review Form to allow USFWS to determine if application of the herbicide(s) can be covered under the PBO.

- **2,4-D amine**. 2,4-D amine acts as a growth-regulating hormone on broad-leaf plants, being absorbed by leaves, stems and roots, and accumulating in a plant's growing tips. If a Project Proponent uses 2,4 D amine, this action requires a 15-foot buffer when hand applied, and a 50-foot buffer when it is applied using a backpack sprayer.
- **Aminopyralid.** This is a relatively new selective herbicide first registered for use in 2005. It is used to control broadleaf weeds and is from the same family of herbicides as clopyralid, picloram and triclpyr. Aminopyralid is proposed to be used for the selective control of broadleaf weeds. Acute toxicity tests show aminopyralid to be practically nontoxic, with aquatic invertebrates showing more sensitivity. Thus, if aminopyralid does end up in surface waters, the most likely pathway of effect for fish is through loss of prey.
- **Chlorsulfuron.** This herbicide is used to control broadleaf weeds and some annual grasses. Chlorsulfuron is readily absorbed from the soil by plants. This herbicide does not bioaccumulate in fish. The buffers and application methods greatly minimize the risk of exposure to listed fish and their prey species.
- **Clethodim.** Clethodim is a post emergence herbicide for control of annual and perennial grasses and is applied as a ground broadcast spray or as a spot or localized spray. This Program is not allowing it for broadcast application; it is allowed for hand application and backpack sprayer, both with a 50-foot buffer.
- **Clopyralid.** Clopyralid is a relatively new and very selective herbicide. It is toxic to some members of only three plant families. It is very effective against knapweeds, hawkweeds, and Canada thistle. Clopyralid does not bind tightly to soil, and thus would seem to have a high potential for leaching. That potential is functionally reduced by the relatively rapid degradation of clopyralid in soil. It is one of the few herbicides that this Proposed Restoration Effort program proposes to allow up to the waterline (for hand application) but requires a 100-foot buffer for broadcast application. The Proposed Restoration Effort only allows for one treatment per year.
- **Dicamba**. Dicamba is proposed to control broadleaf weeds, brush, and vines. Broadcast application of Dicamba will not be allowed for any project because of issues associated with drift. Leaves and roots absorb dicamba and it moves through the plant. It should be applied during active plant growth periods, with spot and basal bark periodic application during dormancy. It does not bind to soil particles and microbes appear to be the primary source of chemical breakdown in soil.
- **Glyphosate 1 (aquatic)**. Glyphosate is a nonselective herbicide used to control grasses and herbaceous plants; it is the most commonly used herbicide in the world. It is moderately persistent in soil, with an estimated average half-life of 47 days (range of 1 to 174 days). Glyphosate is relatively nontoxic for fish. There is a low potential for the compound to build up in the tissues of aquatic invertebrates. The buffers and application methods greatly minimize the risk of exposure to fish and their prey species.

- **Imazapic.** Imazapic is used to control grasses, broadleaves, vines, and for turf height suppression in noncropland areas. Imazapic is proposed to be used for noxious weed control and rights-of-way management. Its use is proposed to be allowed up to the waterline with hand injection methods, 15-foot buffers for backpack sprayer application, and 100-foot buffers for broadcast application.
- **Imazapyr.** Imazapyr is used to control a variety of grasses, broadleaf weeds, vines and brush species. The buffers and application methods greatly minimize the risk of exposure to fish and their prey species.
- **Metsulfuron-methyl**. The Escort formulation is proposed. It is used to control brush and certain woody plants, broadleaf weeds, and annual grasses. It is active in soil and is absorbed from the soil by plants.
- **Picloram.** This is a restricted-use pesticide labeled for noncropland forestry, rangeland, right-of-way, and roadside weed control. It is a growth inhibitor and is used to control a variety of broadleaf weed species. It is absorbed through the leaves and roots and accumulates in new growth. The use of this herbicide is restricted to hand applications only (no broadcast applications) with a 25+-foot buffer and no use on sandy or riverwash soils. The buffers and application methods greatly minimize the risk of exposure to fish and their prey species.
- **Sethoxydim.** This herbicide is a selective post-emergence pesticide for control of annual and perennial grasses. Its mode of action is lipid biosynthesis inhibition. Project design criteria and conservation measures sharply reduce the risk of exposure. A 50-foot no-application buffer is proposed for both spot spraying and hand application, and a 100-foot buffer for broadcast application. Other factors such as wind speed and weather also reduce the risk of exposure. Thus, the risk of acute or chronic exposure to sethoxydim is low.
- **Sulfometuron-methyl.** At proposed application rates, sulfometuron-methyl is highly toxic to seedlings of several broadleaves and grasses. No chronic exposure is anticipated to occur because the herbicide degrades relatively rapidly. Based on the proposed conservation measures, the risk of exposure to concentrations that result in acute lethal effects or chronic effects is low.
- **Triclopyr (TEA)**. The environmental fate of triclopyr has been studied extensively. This formulation of triclopyr is not highly mobile, although soil adsorption decreases with decreasing organic matter and increasing pH. With the exception of aquatic plants, substantial risks to nontarget species (including humans) associated with the contamination of surface water are low relative to risks associated with contaminated vegetation. The buffers and application methods greatly minimize the risk of exposure to fish and their prey species.

2.1.5.2.5. All-Species Protection Measures

ASP-1, Qualifications of the Qualified Biologist and USFWS-Approved Biologist. Biological monitoring and construction oversight will be provided by biologists at two different experience levels, depending on the activity. These two levels are described in this measure, below. In general, the Qualified Biologist will complete many tasks across species for a Proposed Restoration Project, and the USFWS-Approved Biologist will only be required for specific tasks that require additional species expertise. In some cases, the Qualified Biologist(s) may work under the guidance, direction, or supervision of the USFWS-Approved Biologist. Unless otherwise indicated in Section 2.1.5.3, *Guild- and Species-Specific Protection* Measures, general site surveys and biological monitoring can be conducted by a Qualified Biologist. Because the qualifications for the USFWS-Approved Biologist exceed those for the Qualified Biologist, any activity indicated as appropriate for the Qualified Biologist may also be completed by a USFWS-Approved Biologist.

- **Qualified Biologist**: The Qualified Biologist is required to meet certain qualifications, as confirmed by the Project Proponent. Résumé review by the USFWS is not required for the Qualified Biologist. Minimum qualifications for the Qualified Biologist include a bachelor's degree in biological or environmental science, natural resources management, or related discipline; field experience in the habitat types that may occur at the project site; familiarity with the Covered Species (or closely related species) that may occur at the project site; and prior preconstruction survey, construction monitoring, or construction oversight experience (if and as relevant to the activity to be conducted).
- **USFWS-Approved Biologist**: For some Covered Species, additional qualifications may be required for biologists who would be responsible for species handling or relocation, or other activities (Section 2.1.5.3, *Guild- and Species-Specific Protection Measures*). These activities would be completed by the USFWS-Approved Biologist when required by the protection measures. Résumé(s) for the USFWS-Approved Biologist(s) with experience in the identification of all life stages and ecology of the applicable Covered Species (or closely related species) and their critical habitat will be submitted to the USFWS Field Office for review and approval at least 30 days prior to any activity for which the protection measures indicate that a USFWS-Approved Biologist is required. Because species handling and relocation of some species for proposed restoration projects would be authorized by USFWS through issuance of the PBO and associated ITS, it may not be a requirement for the USFWS-Approved Biologist to hold a federal Section 10(a)(1)(A) Recovery Permit to implement this role on an approved project under this program. However, it is noted that some presence/absence surveys that may be performed by a USFWS-Approved Biologist may require that the person conducting those surveys hold a Section 10(a)(1)(A) Recovery Permit. For any surveys, securing/confirming necessary 10(a)(1)(A) permits and other authorizations should be coordinated with the respective USFWS Field Office or S7 Delegated Authority Program (DAP).

ASP-2, Preconstruction Surveys. If Covered Species and/or their habitat is present, where appropriate and based on project-specific requirements, a Qualified Biologist will conduct visual preconstruction surveys and implement additional protection measures within 5 days prior to beginning work to protect the species and habitat from avoidable construction-related disturbance. The intent of the survey is to assess current species habitat and species use locations in the project area immediately prior to construction. The preconstruction survey is not intended to be a presence/absence or protocol-level survey; the potential for species presence would have already been evaluated prior to project approval. Pre-construction surveys may be phased across a construction site if construction in different areas will occur at different times; only areas where disturbance is imminent need be surveyed. If construction activities at a given location cease for more than 5 consecutive days, and there is potential for Covered Species to reoccupy habitat at that site, the Qualified Biologist will resurvey the project area prior to resuming construction and implement applicable protection measures. Additional guild- and species-specific preconstruction requirements are provided in Section 2.1.5.3, *Guild- and Species-Specific Protection* Measures*,* and may supersede this more GPM, as applicable.

ASP-3, Species Capture, Handling, and Translocation. Covered Species capture, handling, and translocation will only be conducted by a USFWS-Approved Biologist(s). The Project Proponent will prepare a Covered Species translocation plan to be reviewed and approved by the USFWS Field Office as part of the ESA Section 7(a)(2) Review Form. The plan will include capture and translocation methods, translocation site, and post translocation monitoring, if applicable. Additional measures are defined in Section 2.1.5.3, *Guild- and Species-Specific Protection Measures*. If capture, handling, and translocation are necessary due to dewatering activities, see IWW-6, *Dewatering/Diversion*, and follow the USFWS-Approved translocation plan. Additional guild- and species-specific capture, handling, and translocation requirements are described in Section 2.1.5.3, *Guild- and Species-Specific Protection Measures,* and may supersede this more GPM, as applicable.

ASP4, Covered Species Entrapment Prevention. To prevent the accidental entrapment of Covered Species during construction, all excavated, steep-walled holes or trenches will be covered with appropriate covers (e.g., plywood, thick metal sheets, or similar materials) at the end of each workday. Covers will be placed so that trench edges are fully sealed with rock bags, sand, or other appropriate material. Alternatively, one or more escape ramps (e.g., fill dirt or wood planking) will be installed at an angle no greater than 30 degrees, to allow wildlife to escape. Before holes or trenches are filled, sealed, or collapsed, the holes or trenches will be thoroughly inspected for trapped animals. If pipes are stored on site or in associated staging areas, they will be capped when not in use or stored above ground level at an appropriate height to minimize species entrapment and will be inspected before being moved. Any animals discovered will be allowed to escape voluntarily or will be relocated by a USFWS-Approved Biologist. Additional guild- and species-specific entrapment prevention requirements are described in Section 2.1.5.3, *Guild- and Species-Specific Protection Measures,* and may supersede this more GPM, as applicable.

ASP-5, Airborne Noise Reduction. Equipment (including the noise abatement systems) will be maintained in good working order. If construction noise has the potential to adversely affect Covered Species, the Project Proponent will include site-specific protection measures for construction activities in the Project ESA Section 7(a)(2) Review Form to minimize impacts. Muffler (or spark arrester) damage must be promptly remedied.

Potential adverse effects from project-related noise should be avoided or minimized to the maximum extent practicable by implementing sufficient disturbance buffers between noise-generating project activities and covered amphibian, bird, and mammal species habitat. When applicable, species-specific noise buffer distances are provided in Section 2.1.5.3, *Guild and Species-Specific Protection Measures*. Noise buffer distances are distinct from other indicated buffer distances in Section 2.1.5.3, which may relate to an area involving dispersal, visual disturbance, or other considerations; however, incorporating the larger of two buffer distances will provide buffer for both purposes. Noise buffer distances may be modified in coordination with the USFWS Field Office based on project specific characteristics or a Project Proponent/Action Agency may choose to submit their own analysis and buffer recommendations for the USFWS's consideration. If sufficient buffers cannot be implemented, the proposed activities may lead to adverse effects, including possible incidental take.

2.1.5.3. Guild and Species-Specific Protection Measures

The overall process for identifying and compiling Species Protection Measures, as well as measures by guild, are provided in this section. In cases where the species protection measures are similar across multiple species, those measures have been grouped by guild for efficiency and to avoid duplicative text. The identified measures for each Covered Species or Covered Species group (e.g., riparian birds, vernal pool Branchiopoda, and riparian plants) are described in this section. Incidental take is allowed for some Covered Species, up to certain limits (Table 2), after implementation of applicable protection measures.

2.1.5.3.1. Development of Species Protection Measures

Species Protection Measures, as they apply to a particular project, are to be incorporated into the project descriptions for individual projects, in addition to applicable GPMs described in Section 2.1.5.2, *Programmatic General Protection Measures*. Applicable measures should be determined by the Action Agency and the Project Proponent in coordination with the respective USFWS Field Office/S7 Delegated Authority Program when completing the project description/ESA Section 7(a)(2) Review Form. Action Agencies and Project Proponents should refer to Section 2.1.2, *Administration of the PBO,* for more detailed instructions about the administrative process for this consultation. Extended or alternative work windows may be considered on an individual project basis with prior approval from USFWS Field Office or S7 Delegated Authority Program, provided the Action Agency and Project Proponent can demonstrate that measures implemented to avoid or minimize exposure would do so at a level commensurate with the standard work windows.

It is worth highlighting here that CDFW staff provided review of protection measures for dually listed (species that are both listed by the USFWS and by the State of California) and species of

special concern (CNDDBa and CNDDBb 2022 or most recent version and available online at https://wildlife.ca.gov/Conservation/CESA). The language used in the PBA represents the collective response for those species where differences needed to be reconciled. This coordination effort with CDFW was intended to improve state/federal coordination and provide efficiency for CDFW in their project approval processes.

In addition, CDFW staff had previously reviewed the eligible project type descriptions as part of this Statewide Multi-Agency Effort to develop coordinated, expedited programmatic authorizations or permits for eligible restoration projects in California.

Please note the following points regarding the organization of the Species Protection Measures:

- The Covered Species are listed by guild in the following order: 1) amphibians, 2) reptiles, 3) birds, 4) mammals, 5) invertebrates (shrimp species, beetles, and butterflies), 6) fish, and 7) plants.
- Under most guilds, general measures that apply to an entire guild were developed, followed by measures that are applicable to a single species or a smaller group of species. Both the measures for a specific guild and for a single or smaller group of species would need to be evaluated for their applicability to avoid and minimize impacts to a Covered Species.
- The nomenclature used for the Species Protection Measures consists of the acronym for the Covered Species, plus a sequential number. For example, for the arroyo toad, the protection measures are named ARTO-1, ARTO-2, ARTO-3, etc. For groups of species, the nomenclature consists of an acronym for the group, plus a sequential number. For example, for a group of amphibians, the protection measures all use the group name "Amphibians" and are named AMP-1, AMP-2, AMP-3, etc.
- For ease of implementation, the protection measures described for each species are listed in chronological order of project implementation activities (i.e., design, surveys, avoidance, work windows, work restrictions, implementation monitoring, and revegetation monitoring).
- Similar to the approach to animal species protection measures, the approach to plant protection measures is intended to provide Project Proponents with coverage under the PBO, without the need for additional consultation or project-specific biological opinion preparation. Protection measures for plants primarily consist of avoidance measures. When complete avoidance of species with an LAA determination is not possible, additional protection measures have been included in the sections below.

2.1.5.3.2. Amphibians

There are nine federally-listed amphibian species being addressed in this PBO. A list of these amphibian species is provided in Table 5. The General Amphibian Protection Measures described in this section are applicable to all species identified in Table 5. In addition, Species Protection Measures are provided in this section for individual species and—in some instances—groups of species, to avoid or minimize potential adverse effects.

Table 5: Covered Species **– Amphibians**
Self-Imposed Annual Take Limits and Effects Determinations

Common Name	Annual Take Limits	ESA Effects Individuals	ESA Effects Critical Habitat
arroyo (arroyo southwestern) toad	No more than 10 adults or juveniles injured or killed; 5% of larval captures killed or injured; 2 egg strands damaged or destroyed annually.	LAA	LAA
California red-legged frog	No more than 60 terrestrial adults or juveniles injured or killed outside of the Sierra Nevada (shared between Field Offices), 5 terrestrial adults or juveniles injured or killed for locations within the Sierra Nevada; and 5% of larval captures injured or killed annually.	LAA	LAA
California tiger salamander – Central California DPS	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office; No more than 5% of larval captures injured or killed annually.	LAA	LAA
California tiger salamander – Santa Barbara County DPS	No more than 5 adults or juveniles injured or killed annually and no more than 5% of larval captures killed or injured per pond annually.	LAA	LAA
foothill yellow-legged frog	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office. No more than 5% of larval captures injured or killed annually. Individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area.	LAA	Not Applicable
mountain yellow-legged frog – northern California DPS	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office. No more than 5% of larval captures injured or killed annually. Individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area.	LAA	LAA

Santa Cruz long-toed salamander	No more than 5 adults or juveniles injured or killed annually. No more than 5% of larval captures killed or injured per pond annually.	LAA	Not Applicable
Sierra Nevada yellow-legged frog	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office annually. No more than 5% of larval captures injured or killed annually. Individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area.	LAA	LAA
Yosemite toad	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office annually. No more than 5% of larval captures injured or killed annually. Individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area.	LAA	LAA

Notes:

Limits reset on January 1 each year. Limits apply to the entire range of the species (range-wide), unless otherwise indicated.

General Amphibian Protection Measures

In addition to these General Amphibian Protection Measures, several GPMs, as applicable, are important to protect these species. These GPMs include—but are not limited to—GPM2, *Construction Work Windows*; GPM3, *Construction Hours*; GPM4, *Environmental Awareness Training*; GPM5, *Environmental Monitoring*; GPM6, *Work Area and Speed Limits*; GPM7, *Environmentally Sensitive Area and/or Wildlife Exclusion*; GPM9, *Practices to Prevent Pathogen Contamination*; ASP1, *Qualifications of the Qualified Biologist and USFWS-Approved Biologist*; ASP2, *Preconstruction Surveys*; ASP3, *Species Capture, Handling, and Translocation*; ASP4, *Entrapment Prevention*; WQHM3, *Erosion Control Plans*; WQHM4, *Hazardous Materials Management and Spill Response Plan*; and VHDR6 and VHDR7 (for herbicide use).

The following measures, as they apply to a particular project, will be incorporated into the project descriptions for individual projects that may affect any of the covered amphibian species provided in Table 5 and authorized under the PBO.

AMP-1, *Wildlife Passage Design.* For projects that include the installation, repair, or replacement of permanent or temporary fencing (e.g., security, landscape, or privacy fencing) fencing will be designed to allow for permeability; it will incorporate a minimum 6-inch gap at regular intervals to allow for covered amphibians to disperse between upland and breeding habitat. This measure is not applicable to ESAF or WEF specified as part of construction

activities to protect habitats or exclude wildlife from the work areas. Facilities such as curbs, drainages, culverts, and fence "footers" will be designed with gradually sloped sides or intermittent gaps to facilitate wildlife movement.

AMP-2, *Rain Event Limitations.* To the maximum extent practicable, construction activities will be restricted to periods of low rainfall (less than 0.5 inch per 24--hour period) and periods of dry weather (with less than a 50% chance of rain). During these restricted periods, no construction activities will occur between 30 minutes prior to sunset and 30 minutes after sunrise (no night work during rain events). If rain exceeds 0.5 inch during a 24-hour period, work will cease until no further rain is forecast. Construction activities halted due to precipitation may resume when precipitation ceases and the National Weather Service 72-hour weather forecast indicates less than a 50% chance of 0.5 inch of rain or less during a 24--hour period. Before construction activities resume, a Qualified Biologist will inspect the project area and all equipment/materials for the presence of Covered Species of amphibians.

AMP-3, *Preconstruction Survey.* If covered amphibians are present or assumed present,[6] no more than 24 hours prior to the date of initial ground disturbance and vegetation clearing, a USFWS-Approved Biologist will walk in the project site to investigate all potential areas that could be used by the Covered Species of amphibians (as identified in Table 5) for feeding, breeding, sheltering, movement, and other essential behaviors. If a covered amphibian species is encountered during the survey, the Project Proponent will refer to and follow procedures described below in AMP-9*, Encounters with Species*; and AMP-10*, Species Observations and Handling Protocol*, for passively allowing the species to move out of the work area or actively relocating the species out of harm's way. Proposed restoration projects that may need to actively relocate amphibians out of harm's way will require the Project Proponent to submit a project-specific species relocation plan for USFWS review and approval, as described in AMP-10.

AMP-4, *Disease Prevention and Decontamination.* To prevent disease conveyance among work sites during project implementation, the USFWS-Approved Biologist will ensure that the decontamination protocols described in CDFW, Aquatic Invasive Species Disinfection/ Decontamination Protocols (CDFW 2016 or latest version) will be implemented prior to gear and equipment arriving at or moving between work sites and will be followed at all times. A copy of the code of practice must be available at the project site.

AMP-5, *Lighting.* In addition to GPM-*3, Construction Hours*, artificial lighting at a project site will be prohibited to the maximum extent practicable during the hours of darkness, except when necessary for driver or pedestrian safety.

AMP-6, *Clearing and Grubbing Vegetation.* A USFWS-Approved Biologist will be present during all vegetation clearing and grubbing activities in areas within the currently occupied range of Covered Species of amphibians where suitable habitat is present. Before vegetation removal, the USFWS-Approved Biologist will thoroughly survey the area for these species (see AMP-3, *Preconstruction Survey)*. Either vegetation in sensitive areas will be cleared with handheld motorized tools (e.g., weed eaters or chainsaws) or by hand pulling; or a USFWS-Approved Biologist will walk in front of vegetation-clearing equipment. Where dense brush occurs

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[6] The Project Proponent will assume a species is present in an area when suitable habitat is present within the current range of the species and their absence has not been determined by a negative finding using protocol level surveys.

(e.g., blackberry or periwinkle), the USFWS-Approved Biologist may direct an equipment operator to lift and shake dense vegetation with an excavator or backhoe so that the USFWS-Approved Biologist can look underneath and search for amphibians. Tree stumps and roots will be left in place to avoid any ground disturbance and preserve refugia habitat, with the exception of nonnative invasive plants that could propagate from remaining vegetative material. Native branches, leaf litter, mulch, woody debris, and other vegetative trimmings may be retained and spread on site to enhance habitat, as appropriate.

AMP-7*, Pump Screens.* If a waterbody is to be temporarily dewatered by pumping, intakes will be completely screened, consistent with NMFS (1997) and CDFW (2001) screening guidelines or latest updates to those guidelines (currently, where fry-sized salmonids are present, wire mesh openings no larger than 3/32 inch [2.38 mm] for woven wire or perforated plate screens, or 0.0689 inch [1.75 mm] for profile wire screens, and other relevant criteria such as limited approach velocities), to avoid entrainment or impingement of larval amphibians. The intake will be placed in a perforated bucket or another method to attenuate suction, to prevent Covered Species of amphibians from entering the pump system. Water will be returned to the water body when diversions or cofferdams are removed and flow is restored (consistent with measures in Section 2.1.5.2.2, *Dewatering Activities and Aquatic Species Relocation*). If no diversion or cofferdams are used during dewatering, the waterbody will be allowed to refill naturally from precipitation, runoff, or hydrological processes.

AMP-8*, Removal of Nonnative Invasive Species.* Removal of any individuals of nonnative invasive species (e.g., bullfrogs, nonnative crayfish, or nonnative fishes) is encouraged as practicable to facilitate conditions for project success. The Project Proponent is responsible for ensuring that these activities comply with the California Fish and Game Code. Suspected hybrid California tiger salamander will not be removed without specific authorization from USFWS (and CDFW, in accordance with their requirements). More details on nonnative animal removal are provided below.

1. In federally-listed aquatic species occupied habitat, a USFWS-Approved Biologist will be present during removal activities. Less experienced personnel assisting with removal efforts will get confirmation of species identification of all vertebrates prior to collection and removal.
2. All individuals participating in removal activities will have training in identification of Covered Species that might be present and nonnative species proposed for removal and proper techniques for all planned removal methods prior to the initiation of removal activities.
3. Crew size, along with the amount of time spent in any given habitat area, will be kept to the minimum necessary. Repeated disturbance of any given area within a single year will be avoided unless necessary for eradication purposes.
4. To the extent feasible, both native and nonnative fauna will be examined for signs of diseases or parasites soon after capture, and any abnormalities will be photographed and documented.

5. Prior to initiation of electrofishing activities in Covered Species habitat, the names and credentials of all electrofishing crew leaders will be submitted for review and approval by USFWS.
6. The USFWS-approved electrofishing crew leader will provide training to the crew regarding potential risks associated with electrofishing and injury to Covered Species. The crew will also be trained to identify signs of injury and appropriate response.
7. Electrofishing will be conducted using the minimum pulse rate and width that is effective. Only direct or pulsed direct current will be used. In shallow waters, undercut banks, near algal mats or other areas where Covered Species can be concentrated or are more likely to come into close contact with electrofishing equipment, the amount of time spent electrofishing will be minimized.
8. If any Covered Species are immobilized by electrofishing activities, they will be carefully removed from the water body by a USFWS-Approved Biologist until activities are completed. These individuals will be held for the minimum amount of time necessary and monitored until they are completely mobile and then returned to the point of capture.
9. Handling of individuals (e.g., arroyo toad, California red-legged frog) may occur if they are inadvertently collected by net or trap, in accordance with procedures for handling in AMP-11 and FISH-3. These individuals will be released at the place of capture or will be relocated to the nearest available suitable habitat.
10. Gill nets will be used upstream and downstream of occupied stream stretches, but not in stream stretches where Covered Species might occur. Where gill nets are used, they will not be left unattended overnight
11. If traps are used, they will be carefully monitored to minimize the potential for injury and mortality of nontarget species. Fish traps will be used under the following conditions: (a) fish traps will be checked a minimum of once a day; (b) fish traps will be set so that air will be available at the top of the trap; and (c) if predator tracks adjacent to or signs of predator tampering with fish traps occur, these traps will be closed for a period of time until predator activity is no longer detected.

AMP-9*, Placement of Suitable Erosion Control Material.* To prevent amphibians from becoming entangled, trapped, or injured, erosion control materials that use plastic or synthetic monofilament netting will not be used. Silt fencing can be used because it is not considered a netting and does not entangle species. 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 the movement of Covered Species of amphibians.

AMP-10*, Encounters with Species.* Each encounter with a covered amphibian will be treated on a case-by-case basis. If any life stage of the Covered Species of amphibian is found and these individuals may potentially be killed or injured by work activities, the following will apply:

a. If a Covered Species of amphibian is detected in the project area, work activities within 50 feet of the individual that may potentially be harmed, injured, or killed will cease immediately, and the USFWS-Approved Biologist will be notified. Based on the professional judgment of the USFWS-Approved Biologist, if project activities can be conducted without harming or injuring the species, it may be left at the location of discovery and monitored by the USFWS-Approved Biologist. All project personnel will be notified of the finding, and at no time will work occur within 50 feet of a species without a USFWS-Approved Biologist present.

b. Contact with the Covered Species of amphibian will be avoided, and the amphibian will be allowed to move out of the potentially hazardous situation of its own volition. Allowing a Covered Species of amphibian to move out of the potentially hazardous situation of its own volition may not be appropriate for multi-day projects because covered amphibians could stay or move back into the project site. If there is an immediate hazard or if there is no suitable, accessible habitat nearby to which the amphibian may relocate, the amphibian will be moved following approved handling protocol (see AMP-11, *Species Observations and Handling Protocol*).

c. Not to exceed the self-imposed take limits provided in Table 4.

AMP-11, *Species Observations and Handling Protocol.* The potential need to handle and relocate covered amphibian species should be evaluated during the technical assistance step shown in Figure 2. If a Covered Species of amphibian (as identified in Table 5) does not or cannot leave the work area and handling covered amphibians (as identified in Table 5) is required, capture and relocation will only be allowed in accordance with a plan developed in accordance with the guidance below and submitted to USFWS for review and approval. Although it could be submitted after the ESA Section 7(a)(2) Review Form, to avoid project delays and facilitate timely USFWS review and approval, a draft of the capture and relocation plan may be submitted with the ESA Section 7(a)(2) Review Form. The capture and relocation will be conducted by a USFWS-Approved Biologist. In addition to measures described in GPM-9*, Practices to Prevent Pathogen Contamination*; and AMP-5*, Clearing and Grubbing Vegetation* (which refers to CDFW [2016] decontamination protocols), to prevent the spread of pathogens among sites, special care should be taken to prevent transferring potential pathogens among individual animals, as described below.

a. Prior to handling and relocation, the USFWS-Approved Biologist will take precautions to prevent the 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* (USFWS 2003).

    i. All dirt and debris, including mud, snails, plant material (including fruits and seeds), and algae, should be removed from nets, traps, boots, vehicle tires and all other surfaces that have come into contact with water. Cleaned items should be rinsed with clean water before leaving the work area.

ii. Boots, nets, traps, etc., should then be scrubbed with either a 70% ethanol solution, a bleach solution (0.5 to 1.0 cup of bleach to 1.0 gallon of water), QUAT 128 (quaternary ammonium, use 1:60 dilution), or a 6% sodium hypochlorite 3 solution and rinsed clean with water between study sites. Cleaning equipment in the immediate vicinity of a pond or wetland should be avoided. Care should be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.
iii. When working at sites with known or suspected disease problems, disposable gloves should be worn and changed between handling each animal.
iv. Used cleaning materials (liquids, etc.) should be disposed of safely, and if necessary, taken back to the lab for proper disposal. Used disposable gloves should be retained for safe disposal in sealed bags.

b. Disinfecting equipment and clothing is especially important when biologists are coming to the project area to handle amphibians after working in other aquatic habitats (see *GPM-9* and *AMP-5*, which reference CDFW [2016] protocols). Covered amphibians will also be handled and assessed according to the Restraint and Handling of Live Amphibians (USGS 2001).

Covered amphibians will be captured by hand, dip net, seine net, or other USFWS-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. Soaps, oils, creams, lotions, repellents, or solvents of any sort cannot be used on hands within two hours before and during periods when the biologist is capturing and relocating individuals. Individuals will be relocated to areas containing suitable habitat, as identified in the relocation plan. If the animal will be held in captivity for any length of time, they shall be kept in a cool, dark, moist environment with proper airflow, such as a clean and disinfected bucket or plastic container with a damp sponge. Holding/transporting containers will not contain any standing water, objects (except sponges), or chemicals. Holding/transporting containers and dip nets will be thoroughly cleaned, disinfected, and rinsed with fresh water prior to use in the project area (see CDFW 2016 for disinfection protocols). USFWS will be notified (e.g., via phone, email, or text message) as soon as practicable and no longer than 1 week after all capture, handling, and relocation efforts.

If an injured covered amphibian is encountered, and the USFWS-Approved Biologist determines that the injury is minor or healing and the individual is likely to survive, the individual will be released immediately, consistent with measures above. The individual(s) will be monitored until it is not imperiled by predators or other dangers.

If the USFWS-Approved Biologist determines that a covered amphibian has major or serious injuries as a result of project-related activities, the USFWS-Approved Biologist will take it to a USFWS-Approved facility as soon as practicable, if such a facility is within a reasonable distance from the project site. 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

USFWS. 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 USFWS, as described below.

Notification to USFWS of an injured or dead covered amphibian (as identified in Table 5) in the project area will be made and reported, whether or not its condition resulted from project-related activities. In addition, the USFWS-Approved Biologist or Project Proponent will follow up with USFWS in writing (e.g., email) within 2 calendar days of the finding. Written notification to USFWS will include the following information: the species; number of animals taken or injured; sex (if known); date, time, and 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 USFWS regarding the disposition of the specimen.

Arroyo Toad

ARTO-1*, Conduct Habitat Assessment.* A habitat assessment will be conducted by a Qualified Biologist to determine whether the project area contains suitable habitat for the arroyo toad. If suitable habitat for this species is identified and the proposed project may affect suitable habitat that is *not* known to be occupied by the arroyo toad, the appropriate USFWS Office will be contacted regarding the need for surveys according to USFWS protocol (USFWS 1999a), and those surveys will be conducted, as appropriate. Alternatively, the Project Proponent may choose to implement the following avoidance measures for this species, based on the presence of suitable habitat, without confirming the presence or absence of the species by conducting protocol surveys.

ARTO-2*, Work Window.* To minimize effects to breeding arroyo toads, all project activities in occupied breeding habitat will occur outside the breeding season (i.e., the breeding season is March 15 through July 15 for arroyo toad).[7] In addition:

a. If the breeding season cannot be avoided, a USFWS-Approved Biologist will conduct surveys no more than 24 hours before project work. If no arroyo toads of any life stages or clutches are found in the project area, project activities may proceed.

b. If the breeding season cannot be avoided and arroyo toads are found in the project area, a USFWS-Approved Biologist will conduct daily surveys before project work begins until the beginning of the nonbreeding season, or until project activities have ceased.

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[7] Extended or alternative work windows may be considered on an individual project basis with prior approval from USFWS ES, provided the Project Proponent can demonstrate that measures implemented to avoid or minimize exposure would do so at a level commensurate with the standard work windows.

c. If a project is 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 through October 1), thereby further reducing the preferred work window described above in ARTO-2, for use of heavy machinery, to the period between October 2 and March 14. Use of heavy equipment may commence prior to October 2 if surveys demonstrate that juvenile toads have metamorphosed and moved away from the breeding habitat, and juvenile toads have not been found on the banks of breeding habitat for more than 30 days.

d. Not to exceed the self-imposed take limit of 10 adults or juveniles injured or killed annually, five% of larval captures killed or injured annually, two egg strands damaged or destroyed annually.

California Red-Legged Frog and California Tiger Salamander (Central California DPS and Santa Barbara DPS)

CRLF-CTS1, *Work Windows.* For the California red-legged frog and California tiger salamander, project activities in uplands will be confined to May 1 through October 31, [8] unless there is a rain event forecast likely to generate measurable fall, rain of 1 inch or greater, at which time work will cease for the fall season. For project activities in occupied aquatic breeding habitat, grading and other disturbance will avoid the breeding season and will be limited to between July 1 and October 31, unless preconstruction surveys and monitoring demonstrate that young-of-year (recently metamorphosed) amphibians have dispersed from the breeding habitat. In that case, based on the recommendation of the USFWS-Approved Biologist, and with written approval from the USFWS (e.g., email), the Project Proponent may proceed with work in aquatic breeding habitat prior to July 1. Work in a pool or wetland may also begin before July 1 if the pool or wetland has been dry for a minimum of 30 days before initiating work. Not to exceed the self-imposed take limits in Table 5 *Covered Species - Amphibians*.

CRLF-CTS-2, *Nonnative Animal Removals.* During electrofishing activities, in or near California red-legged frog occupied habitat, a USFWS-Approved Biologist will precede the electrofishing crew and survey for California red-legged frogs. If any California red-legged frogs are detected, they will be captured and held outside the waterbody until the electrofishing activities at that location have been completed. All individuals would then be immediately returned to the point of capture. California red-legged frog tadpoles will not be removed from habitat during electrofishing. If a tadpole is shocked then it should be captured (e.g., placed in shallow container) and monitored until it regains function, and then released at point of capture. If it does not regain function then should be reported as a mortality. If California red-legged frogs are detected but escape capture, the USFWS-Approved Biologist will determine measures for avoiding or minimizing impacts to individuals (i.e., leave the area or limit the duration of shocking pulses).

Sierra Nevada Yellow-Legged Frog, Mountain Yellow-Legged Frog (Northern California DPS), and Foothill Yellow-Legged Frog

SNYLF-MYLF-FYLF-1, *Work Windows.* For projects where the Sierra Nevada yellow-legged frog, mountain yellow-legged frog, and foothill yellow-legged frog are known or assumed to occur, project activities in uplands areas will be confined to August 1 through October 31.[8] Not to exceed the self-imposed take limits in Tables 4 and 5.

For project activities in occupied aquatic breeding habitat that typically dries before the end of autumn, grading and other disturbance will be confined to May 1 through November 15, and to when the breeding habitat feature (or portion of the feature where work would occur) has been dry for a minimum of 30 days before initiating work.[8]

These frogs have a multi-year larval development stage and are present in aquatic breeding habitat year-round. Therefore, project activities in occupied aquatic breeding habitat that does not dry before the end of autumn will be confined to May 1 through November 15[8] and will require a USFWS-Approved capture and relocation plan (see AMP-11, *Species Observations and Handling Protocol*) prior to initiating grading and other disturbance in the aquatic breeding habitat. Dewatering sites will be located and timed to avoid and minimize adverse effects to instream flows and depletion of pool habitat.

SNYLF-MYLF-FYLF-2*, Water Temperature.* Project activities will not result in long-term deleterious changes to water temperatures in occupied or potential habitat.

SNYLF-MYLF-FYLF-3*, Borrow Site Sediment Control.* Any borrow sites used will be developed so that the topsoil is removed and piled at the base of the slope to act as a berm catching any sediment that may be transported down slope. For most of the period during borrow, the slope will have a low basin at the base of the borrow area that can be substituted as a sediment pond (if needed) during a storm event. If applicable, all remaining spoils not used during construction will be hauled off site and deposited in stable areas once construction is complete.

Yosemite Toad

YOTO-1*, Work Windows.* For projects where the Yosemite toad is known or assumed to occur, construction within 1,000 feet of occupied (known or suspected) breeding habitat will begin no sooner than 15 days after the breeding habitat is dry or the last larvae has metamorphosed (typically between July 15 and September 15). Habitat condition and Yosemite toad developmental stage will be determined on a site-specific, annual basis, either by coordinating with the USFWS or others conducting Yosemite toad monitoring, or through project-specific surveys or monitoring. Occupied breeding habitat will not be dewatered while larval Yosemite toads are present.

All construction activity within 1,000 feet of occupied habitat (known or suspected) will end prior to October 1 to allow for overwintering migrations and protection of overwintering Yosemite toads. End date timing may be adjusted from October 1 to October 15, if approved in writing (e.g., email) by USFWS. Adjustment of end date timing may be based on temperatures and toad activity observed in September, during construction monitoring, and on forecasted temperatures for early October.

Not to exceed the self-imposed take limit of no more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office annually; no more than 5% of larval captures

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[8] Extended or alternative work windows may be considered on an individual project basis with prior approval from USFWS ES, provided the Project Proponent can demonstrate that measures implemented to avoid or minimize exposure would do so at a level commensurate with the standard work windows.

injured or killed annually. Individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area.

YOTO-2, *Water Temperature.* Project activities will not result in long-term changes to water temperatures and will not adversely modify microhabitat conditions important to Yosemite toad, including shallow flow through wet meadows and pool habitat in wet meadows.

YOTO-3, *Borrow Site Sediment Control.* Any borrow sites used will be developed so that the topsoil is removed and piled at the base of the slope to act as a berm catching any sediment that may be transported down slope. For most of the period during borrow, the slope will have a low basin at the base of the borrow area that can be substituted as a sediment pond, if needed, during a storm event. If applicable, all remaining spoils not sued during construction will be hauled off site and deposited in stable areas once construction is complete.

YOTO-4, *Lupine Areas.* Where possible, open, dry lupine areas with rodent burrows will be avoided. Projects shall not use open and dry lupine areas as turn-around locations, vehicle storage, or equipment staging unless first surveyed and rodent burrows are absent. If walking through these sites, avoid walking where numerous rodent burrows and lupine are observed. Minimize trips and only use one access route if access is needed.

YOTO-5, *Debris Disposal and Piling.* Debris (e.g., vegetation, rocks, or logs) from the proposed project will be put in appropriate locations that do not damage suitable upland habitat, remove cover components, or create dispersal barriers. Vegetation and tree materials will not be scattered, they will be piled. No piling of slash or debris within meadows, streams, or riparian vegetation. When selecting locations for piles that may be within 1,000 feet of known occupied toad meadows, avoid piling in open, dry areas with lupine unless the area is surveyed and there are no rodent burrows present. Do not pile on or within 20 feet of old stumps.

YOTO-6, *Burning Piles.* If piles will be burned, they shall be ignited using a pattern that allows animals to escape the fire. For example, light the pile from the top, leaving the bottom perimeter unignited to serve as an escape route. Slash or debris piles located within 300 feet of occupied toad meadows should be burned in the fall to minimize impacts to terrestrial habitats and spring dispersal of adult toads. If burning needs to occur in the spring, additional site-specific measures will be developed to ensure maximum protection of individual toads that may be in the area.

Santa Cruz Long-Toed Salamander

SCLTS-1, *Habitat Impact Avoidance.* Projects requiring ground disturbance in known or potentially occupied suitable habitat for Santa Cruz long-toed salamander (e.g., isolated ponds) will require submittal of detailed project design information in the ESA Section 7(a)(2) Review Form for review and approval from USFWS. Not to exceed the self-imposed take limit of no more than five adults or juveniles injured or killed annually and no more than 5% of larval captures killed or injured per pond annually.

SCLTS-2, *Work Windows*. For the Santa Cruz long-toed salamander, project activities in uplands will be confined to April 15 through October 31, unless there is a rain event forecast likely to generate measurable rainfall (rain of 1 inch or greater) at which time work will cease for

the fall season. For project activities in occupied aquatic breeding habitat, grading and other disturbance will be limited to when the breeding habitat is dry.[9]

2.1.5.3.3. Reptiles

There are three federally-listed reptile species being addressed in this PBO. A list of these reptile species is provided in Table 6. The General Reptile Species Protection Measures described in this section are applicable to all species identified in Table 6. In addition, Species Protection Measures are provided in this section for individual species, to avoid or minimize potential adverse effects.

Table 6: Covered Species **– Reptiles**
Self-Imposed Annual Take Limits and Effects Determinations

Common Name	Annual Limits	ESA Effects Individuals	ESA Effects Critical Habitat
Alameda whipsnake (striped racer)	Injury or mortality to no more than 4 adults or juveniles/hatchlings annually. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.	LAA	LAA
giant garter snake	Injury or mortality to no more than 4 adults or juveniles/hatchlings annually. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.	LAA	Not Applicable
San Francisco garter snake	Injury or mortality to no more than 4 adults or juveniles/hatchlings annually. No permanent loss of hibernacula.	LAA	Not Applicable

Notes:

Limits reset on January 1 each year. Limits apply to the entire range of the species (range-wide), unless otherwise indicated.

LAA = ESA determination of may affect, and is likely to adversely affect

[9] Extended or alternative work windows may be considered on an individual project basis if approval by USFWS ES is applied for in advance and the Project Proponent can demonstrate that measures implemented to avoid or minimize exposure would do so at a level commensurate with the standard work windows.

General Reptile Protection Measures

In addition to these General Reptile Protection Measures, several GPMs (as applicable) are important to reduce potential effects on the species listed in Table 6. These GPMs include but are not limited to GPM-2, *Construction Work Windows*; GPM-3, *Construction Hours*; GPM-4, *Environmental Awareness Training*; GPM-5, *Environmental Monitoring*; GPM-6, *Work Area and Speed Limits*; GPM-7, *Environmentally Sensitive Area and/or Wildlife Exclusion*; ASP-1, *Qualifications of the Qualified Biologist and USFWS-Approved Biologist*; ASP-2, *Preconstruction Surveys*; ASP-3, *Species Capture, Handling, and Translocation*; ASP-4, *Entrapment Prevention*; WQHM-3, *Erosion Control Plans*; WQHM-4, *Hazardous Materials Management and Spill Response Plan*; and VHDR-6 and VHDR-7 (for herbicide use).

The following general reptile protection measures should be considered for inclusion in the project if the project may affect any of the covered reptile species listed in Table 6.

REP-1*, Preconstruction Survey.* A Qualified Biologist will conduct preconstruction surveys for the target reptile species within 72 hours prior to any initial ground disturbance in all suitable habitat in or adjacent to the project site and accessible to the Project Proponent, to identify locations where covered reptiles may be present, evaluate current activity status in the project area, and protect the species and its habitat from avoidable construction-related disturbance. The intent of the survey is to assess current species habitat and use locations in the project area immediately prior to construction. The preconstruction survey is not intended to be a presence/ absence or protocol-level survey; the potential for species presence would have already been evaluated prior to project approval. Preconstruction surveys may be phased across a construction site if construction in different area will occur at different times; only areas where disturbance is imminent need be surveyed. The project area will be reinspected by a Qualified Biologist whenever a lapse in construction activity of 5 days or greater has occurred.

REP-2*, Environmentally Sensitive Areas and Wildlife Exclusion.* If WEF is used (see GPM-7, *Environmentally Sensitive Areas and Wildlife Exclusion* for further details), the following applies:

- For the San Francisco garter snake, WEF will be established in the uplands immediately adjacent to aquatic snake habitat (e.g., waterbodies, including ponds, wetlands, and riparian areas) and extending up to 200 feet from construction activities.
- For the giant garter snake, WEF will be installed prior to the start of ground-disturbing activities and after aquatic habitat (e.g., waterbodies, including ponds, wetlands, and riparian areas) has been dewatered (if applicable).

The fencing will be inspected by a Qualified Biologist before the start of each workday and maintained by the Project Proponent until completion of the project. The fencing will be removed after all construction equipment is removed from the project site. To prevent reptiles from becoming entangled, trapped, or injured, fencing materials that include plastic or synthetic monofilament netting will not be used. Acceptable materials include natural fibers such as jute, coconut, twine, or other similar fibers.

REP-3*, Clearing and Grubbing Vegetation.* A Qualified Biologist will be present during all vegetation clearing and grubbing activities in areas where the Covered reptiles (as identified in Table 6) are confirmed to occur, or where measures are being implemented based on presence of suitable habitat. Before vegetation removal, the Qualified Biologist will thoroughly survey the area for these species. Vegetation in sensitive areas will be cleared by handheld motorized tools (e.g., weed eaters or chainsaws) or by hand pulling, unless alternate methods are proposed by the Project Proponent and approved by USFWS. Tree stumps and roots will be left in place to avoid any ground disturbance and preserve refugia habitat, with the exception of nonnative invasive plants that could propagate from remaining vegetative material. Native branches, leaf litter, mulch, woody debris, and other vegetative trimmings may be retained and spread on site to enhance habitat as appropriate.

REP-4*, Prohibited Use of Rodenticides.* No rodenticides will be used at the project site during construction in areas that support suitable habitat for the Covered reptiles.

REP-5*, Species Observations and Encounters.* Each Proposed Restoration Project with the potential to encounter a Covered Species of reptile will submit a rescue and relocation plan to USFWS for review and approval at least 30 days before initiating construction. It is recommended that the rescue and relocation plan be provided as part of the ESA Section 7(a)(2) Review Form to reduce potential delays. General guidance to be considered during plan development is as follows: 1) leave the uninjured animal if it is not in danger; or 2) move the animal to a nearby location if it is in danger as described in *REP-6, Species Handling and Relocation*. These options are further described as follows:

- When a protected reptile is encountered in the project area, the 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 USFWS-Approved Biologist then needs to assess the situation to select the course of action that will minimize adverse effects to the individual.
- 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. This guidance only applies to situations where an animal is encountered while moving through habitat and under conditions that will allow it to escape. This does not apply to animals that are uncovered or otherwise exposed or in areas where there is not enough adjacent habitat to support the life history of the protected reptiles if they move outside the construction footprint.
- Avoidance is the preferred option if the animal is not moving or is in some sort of burrow or other refugia. In this case, the area will be well marked for avoidance by construction equipment, and a USFWS-Approved Biologist will be assigned to the area when work is taking place nearby. If avoidance is not practicable or safe for the Covered reptile species, the Project Proponent will implement *REP6*.

REP-6*, Species Handling and Relocation.* A protected reptile will only be captured and relocated when that is the only option to prevent its death or injury, and after all attempts to avoid interaction of the species have been exhausted, as described in *REP-5, Species Observation and Encounters.* Project-specific rescue and relocation plans will be submitted by

the Project Proponent and pre-approved by USFWS. General guidance for handling and relocation is as follows:

- If appropriate habitat is immediately adjacent to the capture location, then the preferred option is short-distance relocation to that habitat. A 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 property owner's written permission. It is the Project Proponent's responsibility to arrange for that permission.
- The release locations must be pre-identified in the Project-specific rescue and relocation plan approved by USFWS; they 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, other suitable refugia, or suitable habitat.
- Only a USFWS-Approved Biologist for the project can capture protected reptiles.

Alameda Whipsnake (Striped Racer)

AWS-1, *Habitat Avoidance and Work Window.* Ground disturbance and vegetation clearing in scrub/chaparral habitat will be avoided to the maximum extent possible. Project activities in suitable habitat in the currently occupied range of the species where Alameda whipsnake is known to be or may be present will be confined to April 1 through October 31.[10] To the extent practicable, all rock outcrops will be avoided. Not to exceed the self-imposed take limit of injury or mortality to no more than four adults or juveniles/hatchlings annually. The self-imposed take limit also requires no net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.

AWS-2, *Daily Timing Restrictions.* To avoid or minimize effects on the Alameda whipsnake and its habitat, construction and ground disturbance will occur only during daytime hours, will cease no less than 30 minutes before sunset, and may not begin again earlier than 30 minutes after sunrise. If nighttime work is needed, the Project Proponent should explain in the ESA Section 7(a)(2) Review Form why it is needed, along with any additional protection measures that may be appropriate, for review and approval by the USFWS Field Office. A Qualified Biologist will inspect the site prior to vehicle operation and will monitor construction activities.

Giant Garter Snake

The following measures will be implemented in suitable giant garter snake habitat within the current range of the species, or where the species is known or suspected to occur.

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[10] Extended or alternative work windows may be considered on an individual project basis with prior approval from USFWS ES, provided the Project Proponent can demonstrate that measures implemented to avoid or minimize exposure would do so at a level commensurate with the standard work windows.

GGS-1, *Biologists.* A USFWS-Approved Biologist will oversee construction activities in, or within, 200 feet of suitable giant garter snake aquatic or upland habitat and will direct Qualified Biologists who may also support the project. A Qualified Biologist will be present during vegetation removal in giant garter snake habitat and during construction activities adjacent to aquatic habitat. The Qualified Biologist will walk ahead of the removal of emergent wetland and herbaceous upland vegetation.

The USFWS-Approved Biologist will be available on an on-call basis during activities with the potential to affect giant garter snake. If needed, the USFWS-Approved Biologist will remain on site during construction activities to protect giant garter snake. The USFWS-Approved Biologist or any Qualified Biologist working on site will have the authority to stop work if a giant garter snake is encountered in the construction area. No snakes will be moved, relocated, or handled unless the Project Proponent has submitted a snake rescue and relocation plan to USFWS, and USFWS has reviewed and approved the plan. Project Proponents may choose to submit their snake relocation plan to USFWS with their ESA Section 7(a)(2) Review Form to expedite review and approval; or may develop the plan in coordination with USFWS after the ESA Section 7(a)(2) Review Form has been submitted, but before construction begins.

GGS-2, *Minimize Footprint.* Disturbance to suitable aquatic and upland sites in or near the proposed project footprint will be minimized, and the loss of aquatic habitat and grassland vegetation will be minimized through adjustments to proposed project design. Not to exceed the self-imposed take limit of injury or mortality to no more than four adults or juveniles/hatchlings annually. The self-imposed take limit also requires no net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.

GGS-3, *Work Window.* Project activities within 200 feet of suitable aquatic habitat within the current range of the species will be confined to May 1 through October 1.[11]

GGS-4, *Speed Limit.* Posted speed limit signs will be observed on local roads and a 15-mph speed limit will be observed within 200 feet of suitable giant garter snake habitat, unless measures have been taken to exclude giant garter snake from the work area, and confirmed by the USFWS-Approved Biologist. Drivers will stop for snakes on the roadway and wait for the snake to leave on its own or drive around, completely avoiding the snake.

GGS-5, *Minimize Clearing.* Vegetation clearing within 200 feet of suitable giant garter snake aquatic habitat will be confined to the minimal area necessary to facilitate construction activities and protect giant garter snake. Movement of heavy equipment will be confined to the construction footprint, existing roadways, and temporary construction access roads established during construction. In coordination with the USFWS-Approved Biologist, high-use areas should

[11] Extended or alternative work windows may be considered on an individual project basis with prior approval from USFWS ES, provided the Project Proponent can demonstrate that measures implemented to avoid or minimize exposure would do so at a level commensurate with the standard work windows.

be cleared to reduce cover for giant garter snake, and vegetation in other areas should be protected.

GGS-6*, Environmentally Sensitive Areas and Wildlife Exclusion.* A combination of fencing and/or monitoring will be used to protect giant garter snake and will be implemented in coordination with the USFWS-Approved Biologist. If topography and soils of the project site are suitable for fencing, prior to the start of construction and during the active period for giant garter snakes (beginning May 1), the USFWS-Approved Biologist will determine where ESAF will be installed to protect giant garter snake habitat adjacent to the proposed project footprint. WEF will be installed around the perimeter of the work area to minimize the potential for giant garter snakes to enter the construction work area. If work extends beyond October 1 (with approval from the USFWS Field Office),[18] the WEF will be regularly maintained to prevent giant garter snakes from entering the construction limits and using upland areas for overwintering (see GPM-7, *Environmentally Sensitive Areas and/or Wildlife Exclusion*). If WEF is found to be compromised, a Qualified Biologist will conduct a survey immediately preceding construction activity that occurs in designated giant garter snake habitat, or in advance of any activity that may affect other species. The Qualified Biologist will search along WEF and in pipes, culverts, and beneath equipment (e.g., vehicles or heavy equipment) before they are moved (see ASP-4*, Entrapment)*. Monitoring can be conducted in lieu of WEF at sites where installation is not practicable (see GPM-5*, Environmental Monitoring;* and GPM-7, *Environmentally Sensitive Areas and/or Wildlife Exclusion*).

GGS-7*, Minimize Impacts During Clearing.* This measure only applies to areas where there are burrows, cracks, and structures that can provide underground refugia that giant garter snakes can use. During the snake active period (May 1 through October 1), installation of erosion control BMPs, vegetation clearing in or adjacent to aquatic habitat, and the establishment of staging areas within 100 feet of aquatic habitat will occur between 11:00 a.m. and 6:00 p.m., when snakes are most likely to be above ground and active. Time restrictions are only for initial ground disturbance and BMP installation for a given area. A Qualified Biologist will be present during vegetation removal in giant garter snake habitat and during construction activities adjacent to aquatic habitat. The Qualified Biologist will walk ahead of the removal of emergent wetland and herbaceous upland vegetation. Ground disturbance will be confined to the minimal area necessary to facilitate construction activities. Movement of heavy equipment will be confined to existing or temporary interior roads. A 15-day lag time will elapse between the completion of above-ground vegetation removal and commencement of root-zone grubbing activities, to allow snakes that may be present in the immediate area to move to other more suitable habitat.

GGS-8*, Work Stoppage.* A Qualified Biologist will conduct surveys if construction activities stop for 2 weeks or more.

GGS-9*, Working in Aquatic Habitat.* For projects that would affect all, or the majority of, a large aquatic habitat feature where snakes may need to be relocated following the installation of WEF around the aquatic area and the construction footprint, any giant garter snakes observed in the construction zone will be captured and relocated by a USFWS-Approved Biologist. If a giant garter snake is observed in the dewatered area, then the USFWS-Approved Biologist will capture and release the snake following a USFWS-Approved snake relocation plan.

GGS-10, *Dewatering Activities.* Where appropriate to protect giant garter snake, aquatic habitat for the giant garter snake will be dewatered prior to ground disturbance in waterways and remain dewatered and absent of aquatic prey for 48 hours prior to the initiation of construction activities. This approach may be most appropriate where habitats to be dewatered are relatively small compared to adjacent habitats or where the work areas will be isolated within coffer dams. If complete dewatering is not possible, the water feature will be thoroughly inspected by a Qualified Biologist prior to the commencement of construction. If snakes are found, the USFWS-Approved Biologist will proceed as indicated in the previous measures. Engineering controls will be instituted as appropriate to prevent snakes from being entrained by the suction of large pumps used in dewatering. Such controls may include installation of a wire cage to create an area of separation between the water body and the intake. A Qualified Biologist will be present during the initial dewatering activities and will periodically inspect the waterway to confirm that it remains dry and incapable of supporting aquatic giant garter snake prey. If, during project planning, complete dewatering is not anticipated to be possible or appropriate (e.g., would cause more harm than working in the wet), the Project Proponent may propose alternate measures for USFWS review and approval when submitting the ESA Section 7(a)(2) Review Form. At minimum, in the absence of dewatering, the water feature will be thoroughly inspected by a Qualified Biologist prior to the commencement of construction. If snakes are found, the USFWS-Approved Biologist will proceed as indicated in the previous measures.

GGS-11, *Snake Observation.* If a giant garter snake is observed in the construction area, all construction activities will cease, and a USFWS-Approved Biologist will be notified immediately. Once the USFWS-Approved Biologist is at the location of the snake, all construction activities within 200 feet of the snake, if within the fenced construction footprint, will remain on hold to prevent harm to the snake. The snake should be allowed to leave on its own, and activities will not resume until the snake has moved out of the construction footprint on its own. Relocation of the snake will only be allowed as a last resort and in a manner consistent with a project-specific, USFWS-Approved GGS Relocation Plan.

San Francisco Garter Snake

SFGS-1, *Speed Limit.* Observe posted speed limit signs on local roads and observe a 15-mph speed limit within 200 feet of suitable San Francisco garter snake habitat, unless measures have been taken to exclude San Francisco garter snake from the work area, and have been confirmed by the USFWS-Approved Biologist. Drivers will stop for snakes on the roadway and wait for the snake to leave on its own or drive around, completely avoiding the snake.

SFGS-2, *Work Window.* Construction activities will occur when the reptiles are more active, capable of escape, more likely to avoid danger, and less likely to be affected by the Proposed Restoration Project. Project activities in suitable habitat within the currently occupied range of the species will be confined to April 15 through October 31.[12] Project activities will not occur during rain events or within the following 24 hours. Based on temperatures and snake activity observed at the project site in October during construction monitoring, and forecast temperatures

[12] Extended or alternative work windows may be considered on an individual project basis with prior approval from USFWS ES, provided the Project Proponent can demonstrate that measures implemented to avoid or minimize exposure would do so at a level commensurate with the standard work windows.

for early November, the Project Proponent may request an extended work window, until November 15, subject to the review and written (e.g., email) approval of the USFWS Field Office.

SFGS-3*, Daily Timing Restrictions.* All work activities will begin no sooner than 15 minutes after sunrise and will be completed no later than 15 minutes after sunset.

SFGS-4*, Working in or Near Aquatic Habitat.* A Qualified Biologist will be present when working in or near San Francisco garter snake habitat. If topography and soils are suitable for fencing, WEF can be used around staging and stockpiling areas. Not to exceed the self-imposed take limit of injury or mortality to no more than four adults or juveniles/hatchlings annually. No permanent loss of hibernacula.

SFGS-5, *Brush Piles.* San Francisco garter snake may seek cover in brush piles generated during construction activities. Brush piles will be removed from the project site daily or placed daily into containers inaccessible to San Francisco garter snake. If brush piles remain on site and accessible to San Francisco garter snake overnight, the brush piles will be removed by hand to avoid injuring San Francisco garter snake that may take cover within.

2.1.5.3.4. Birds

There are ten federally-listed bird species being addressed in this PBO. A list of these bird species is provided in Table 7.

General Bird Protection Measures

No General Bird Protection Measures were identified to cover all Covered birds; however, birds are grouped by species with similar habitat needs and life histories. For example, General Rail Protection Measures are provided for two rail species.

Several GPMs would reduce potential effects on all Covered bird species, if relevant activities occur on a project site. These measures include but are not limited to GPM-2, *Construction Work Windows*; GPM-3, *Construction Hours*; GPM-4, *Environmental Awareness Training*; GPM-5, *Environmental Monitoring*; GPM-7: *Environmentally Sensitive Areas and Wildlife Exclusion*; ASP-5, *Airborne Noise Reduction*; ASP-1, *Qualifications of the Qualified Biologist and USFWS-Approved Biologist*; ASP-2, *Preconstruction Surveys*; ASP-5, Airborne Noise Reduction; and VHDR-3, *Revegetation Materials and Methods*.

General Rail Protection Measures (California Clapper Rail and Light-Footed Ridgway's Rail)

The following general measures apply to the California clapper rail and light-footed Ridgway's rail and should be included in the project (via the ESA Section 7(a)(2) Review Form) if the project may affect any of these species. Additional, individual Species Protection Measures are provided for some of these species below.

RAILS-1, *Habitat Avoidance*. Disturbance to suitable habitat not required to achieve project goals will be avoided, and damage to marsh vegetation/compression of marsh substrate will be minimized by the use of weight-distributing methods (e.g., crane mats). Not to exceed the self-imposed take limits in Table 7, *Covered Species – Birds*.

RAILS-2, *Work Area Limits*. Work site boundaries in suitable habitat will be clearly marked with flagging, fencing, or other visible materials, which will be removed at the conclusion of the project.

RAILS-3, *Site Access Restrictions*. If the site conditions allow access to work sites in habitat where presence has been confirmed or is presumed will be by foot travel; otherwise, heavy equipment will be allowed in suitable nesting habitats only with the presence of a Qualified Biologist. Access routes and work areas will be limited to the minimum amount necessary to achieve the project goals.

RAILS-4, *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 in habitat where presence has been confirmed or is presumed.

RAILS-5, *Use of Handheld Tools*. Project activity in habitat where presence has been confirmed or is presumed will be limited to the use of handheld tools, including handheld motorized implements such as chainsaws and power augers, unless these methods are not conducive to implementation in this manner, in which case other methods will be proposed in the ESA Section 7(a)(2) Review Form. Tools will be washed prior to use in these habitats, to reduce the potential for spread of nonnative plant species and their seeds. If handheld motorized tools are used, operators will employ GPMs to avoid and minimize soil and water contamination from fuel and lubricants.

RAILS-6, *Site Stabilization.* No soil stabilization materials or offsite materials (e.g., decomposed granite, soil, or rocks) will be added to the surface in occupied habitat.

Table 7: Covered Species **– Birds**
Self-Imposed Annual Take Limits and Effects Determinations

Common Name	Annual Take Limits	ESA Effects Individuals	ESA Effects Critical Habitat
California least tern	No lethal take allowed. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a tern colony. No net loss of habitat through implementation of protection measures and/or offsetting impacts with habitat restoration or enhancement.	LAA	Not Applicable
California clapper rail	Injury or mortality of no more than 1 individual annually. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.	LAA	Not Applicable
coastal California gnatcatcher	Injury or mortality of no more than 1 nest annually. Mortality to a nest would include disturbance to an active nest with egg(s) or chick(s) in the nest or if fledglings are still dependent on the nest for survival. Harm to no more than 2 individuals annually. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.	LAA	LAA

Common Name	Annual Take Limits	ESA Effects Individuals	ESA Effects Critical Habitat
least Bell's vireo	Injury or mortality of no more than 8 individuals and 4 nests annually. Mortality to a nest would include disturbance to an active nest with egg(s) or chick(s) in the nest or if fledglings are still dependent on the nest for survival. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of an occupied pairs' territory, except for restoration projects where the purpose is to remove non-native vegetation to improve least Bell's vireo habitat. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.	LAA	LAA
light-footed Ridgway's rail	Harm to no more than 5% of a given population annually. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.	LAA	Not Applicable
marbled murrelet	Injury or mortality to no more than 1 nesting murrelet pair and their dependent young (1 egg/chick per annual clutch) per recovery unit annually.	LAA	LAA
northern spotted owl	No more than 18 nesting individuals harmed from disturbance annually.	LAA	LAA
southwestern willow flycatcher	Not Applicable	NLAA	NLAA

Common Name	Annual Take Limits	ESA Effects Individuals	ESA Effects Critical Habitat
western snowy plover – Pacific coastal population (Pacific Coast DPS)	Death or injury of no more than 2 individuals annually per recovery unit. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of occupied plover habitat.	LAA	LAA
yellow-billed cuckoo – Western DPS	Not Applicable	NLAA	NLAA

Notes:

Limits reset on January 1 each year. Limits apply to the entire range of the species (range-wide), unless otherwise indicated.

California Clapper Rail (California Ridgway's Rail)

CRR-1, *Protocol-Level Presence/Absence Survey*. Where suitable habitat may exist, USFWS-Approved Biologists qualified to perform presence/absence surveys will conduct protocol-level surveys for the California Clapper rail prior to construction, following the *June 2015 USFWS California Clapper Rail Survey Protocol* (USFWS 2015c) or the most recent version of the protocol. In lieu of conducting USFWS protocol presence/absence surveys, the Project Proponent may choose to assume presence and implement the following avoidance measures, based on the presence of suitable habitat in the current range of the species.

CRR-2, *Species Avoidance and Work Windows*. If a California Clapper rail presence is detected or assumed present[13] in the subject habitat, the following measures will be applied.[14]

e. If the proposed project is in or near a tidal marsh area, activities in or adjacent to California Clapper rail habitat will not occur within 2 hours before or after extreme high tides (6.5 feet or above measured at the Golden Gate Bridge and adjusted to the timing of local high tides) which could prevent California Clapper rails from reaching available cover. Current and predicted tides and currents measured at the Golden Gate Bridge can

[13] The Project Proponent will assume a species is present in an area when suitable habitat is present within the current range of the species and their absence has not been determined by a negative finding using protocol level surveys.

[14] Extended or alternative work windows may be considered on an individual project basis with prior approval from USFWS ES, provided the Project Proponent can demonstrate that measures implemented to avoid or minimize exposure would do so at a level commensurate with the standard work windows.

be accessed via the NOAA website at https://tidesandcurrents.noaa.gov/noaatidepredictions.html?id=9414290&legacy=1.

To minimize or avoid the loss of individual California Clapper rails, activities in or adjacent to tidal marsh areas will be avoided during the California Clapper rail breeding season from February 1 through August 31 each year, including by implementing a noise buffer distance of 1,000 feet in occupied or assumed occupied California Clapper rail habitat. Noise buffer distances may be modified in coordination with the USFWS Field Office based on project specific characteristics or a Project Proponent/Action Agency may choose to submit their own analysis and buffer recommendations for USFWS's consideration. If sufficient buffers cannot be implemented, the proposed activities may lead to adverse effects, including possible incidental take up to the program limit for this species (Table 8).

To minimize or avoid adverse effects to California Clapper rails outside of breeding season (from September 1 through January 31), a noise disturbance buffer of 500 feet will be maintained between noise-generating project activities and occupied or assumed occupied California Clapper rail habitat. Noise buffer distances may be modified in coordination with the USFWS Field Office based on project specific characteristics or a Project Proponent/Action Agency may choose to submit their own analysis and buffer recommendations for USFWS's consideration. If sufficient buffers cannot be implemented, the proposed activities may lead to adverse effects, including possible incidental take up to the program limit for this species (Table 8).

Before beginning work in habitat where a species is present or assumed present,[14] the following must occur:

i. If more than one day has lapsed following ASP-2 Preconstruction Surveys or if vegetative cover has not already been removed, then the Qualified Biologist will survey the work area for presence of California Clapper rails.

ii. If rails are encountered, activities will be halted until the individual has left the area on its own.

Not to exceed the self-imposed take limit of injury or mortality of no more than 1 individual annually. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area. The self-imposed take limit also requires no net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.

Light-Footed Ridgway's Rail

LFRR-1, *Habitat Assessment*. A habitat assessment will be conducted by a Qualified Biologist to determine whether the project area contains suitable habitat (including foraging, nesting, and dispersal habitat) for the rail. If suitable habitat for this species is identified and the proposed project may affect suitable habitat, the Project Proponent will implement measures LFRR-1,

LFRR-2, and RAILS-1 through RAILS-6 in areas with suitable habitat. Alternatively, the Project Proponent may propose to conduct surveys to confirm the presence or absence of the species.

LFRR-2*, Work Window*. To avoid the nesting season of the light-footed Ridgway's rail, project activity in habitat where presence has been confirmed, or is presumed, will be conducted from September 16 through March 14. If project activities must occur during the nesting season, individuals, nests, and occupied or assumed occupied habitat will be avoided by implementing a 500-feet disturbance buffer between noise-generating project activities and light-footed Ridgway's rail habitat Noise buffer distances may be modified in coordination with the USFWS Field Office based on project specific characteristics or a Project Proponent/Action Agency may choose to submit their own analysis and buffer recommendations for the USFWS' consideration. If sufficient buffers cannot be implemented, the proposed activities may lead to adverse effects not to exceed the self-imposed take limit of harm to no more than 5% of a given population annually. The self-imposed take limit also requires no net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area.

California Least Tern

CLT-1*, Habitat Avoidance.* Habitat occupied by California least tern will be avoided to the maximum extent possible.

CLT-2*, Work Windows.* To avoid potential effects on nesting California least tern, project activity in suitable or known nesting habitat where presence has been confirmed or is presumed will occur during the species' nonbreeding season. If breeding season avoidance is not possible, additional monitoring and avoidance measures will be proposed in the ESA Section 7(a)(2) Review Form, for review and approval by the USFWS Field Office:

- For the California least tern, project activities will be confined to October 1 through February 28 (or through February 29 in a leap year), when north of the Monterey/San Luis Obispo county line; and September 16 through March 31, when south of the Monterey/San Luis Obispo county line. [15]

If project construction activities occur adjacent to but not in suitable nesting habitat, project activities will be conducted during the species' nonbreeding seasons. If nonbreeding season construction is not possible, the Project Proponent will employ a USFWS-Approved Biologist to conduct weekly surveys for California least terns.

CLT-3*, Encounters with Species.* If California least terns are observed, the USFWS-Approved Biologist or Project Proponent will notify the USFWS within 1 day of the observation, and a

[15] Extended or alternative work windows may be considered on an individual project basis with prior approval from USFWS ES, provided the Project Proponent can demonstrate that measures implemented to avoid or minimize exposure would do so at a level commensurate with the standard work windows.

Qualified Biologist will monitor all construction activities conducted adjacent to suitable nesting habitat. In addition, if project activities must occur during the nesting season, the Project Proponent will implement an 800-foot disturbance buffer between noise-generating project activities and occupied or assumed occupied California least tern habitat. Noise buffer distances may be modified in coordination with the USFWS Field Office based on project specific characteristics or a Project Proponent/Action Agency may choose to submit their own analysis and buffer recommendations for USFWS consideration. If sufficient buffers cannot be implemented, the proposed activities may lead to adverse effects, not to exceed the self-imposed take limit of no lethal take. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a tern colony. No net loss of habitat through implementation of protection measures and/or offsetting impacts with habitat restoration or enhancement.

CLT-4*, Work Area Limits.* 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-5*, Site Restrictions.* The following measures will apply in suitable nesting habitat for the California least tern:

a. Access to work sites will be by foot travel only. If motorized vehicles, including all-terrain vehicles, are needed at the work sites in suitable nesting habitat, a Qualified Biologist must be onsite.

b. Vehicles, including all-terrain vehicles, used for transport of personnel will be restricted to existing parking lots or roadside parking areas.

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 in habitat where presence has been confirmed or is presumed.

CLT-7*, Use of Handheld Tools and Heavy Equipment.* Nonbreeding season project activity in habitat where presence has been confirmed or is presumed will be limited to the use of handheld tools, including handheld motorized implements such as chain saws and power augers, to the extent practicable. Tools will be washed prior to use in these habitats, to reduce the potential for spread of nonnative and invasive plant species and their seeds. No heavy equipment will be allowed in suitable nesting habitats without the presence of a Qualified Biologist. If handheld motorized tools and/or heavy equipment are used, operators will employ GPMs as appropriate, such as GPM-10, WQHM-1, and WQHM-4 to avoid and minimize soil and water contamination from fuel and lubricants.

Western Snowy Plover (Pacific Coastal Population, or Pacific Coast DPS)

The following measures are those the USFWS considers to be consistent with a not likely to adversely affect (NLAA) determination for the western snowy plover (plover). If modified measures are proposed, the proposed activities may lead to adverse effects, not to exceed the self-imposed take limit of death or injury of no more than two individuals annually per recovery unit. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of occupied plover habitat.

WSP-1, Habitat Avoidance. Habitat occupied by western snowy plover will be avoided to the maximum extent possible.

WSP-2, Work Windows. To avoid adverse effects to nesting plovers and dependent young, proposed work in project Action Areas that include suitable plover habitat should occur during the plover's nonbreeding season (i.e., between 1 October and 28/29 February). If work during the breeding season (i.e., between March 1 and September 30) is required, additional monitoring and avoidance measures shall be followed (see measure WSP-5).

WSP-3, Environmental Awareness Training. Pre-construction environmental awareness training will be conducted by a USFWS-Approved Biologist for all project workers prior to the initiation of work in occupied suitable habitat. The training will include a physical description of plovers, plover nesting habitat, environmental laws, permit requirements, and, most importantly, proper application of these conservation measures. This training will not be required if the Action Agency does not detect plovers during pre-work surveys (described in WSP-3 and WSP-4 below). However, the training may still be required by the USFWS if the Action Agency does not detect plovers on a beach that traditionally has been occupied by plovers either year-round or seasonally (i.e., wintering only or breeding only).

WSP-4*, Nonbreeding "Wintering" Season Measures.* To determine whether plovers are wintering within the Action Area a plover survey will be conducted by a USFWS-Approved Biologist within all suitable habitat in the Action Area one week prior to proposed work activities. If no plovers are detected, work may proceed without restrictions. Surveys shall be conducted weekly thereafter, and work may proceed without restrictions if plovers are not detected. If one or more plovers are detected during a weekly survey, daily pre-activity plover surveys will be started. If no plovers are detected during a daily pre-work survey, work may proceed without restrictions during that day. If plovers are detected, work will stop immediately and not begin again until a USFWS-Approved Biologist has determined that the plovers have vacated the Action Area. If no plovers are detected for 7 consecutive days, daily surveys will be replaced by weekly surveys until plovers are detected again.

WSP-5*, Breeding Season Measures.* To determine whether plovers are occupying the Action Area during the breeding season, a plover survey will be conducted by a USFWS-Approved Biologist within all suitable habitat within the one week prior to proposed work activities. If no plovers are detected, work may proceed without restrictions, but weekly surveys shall continue

throughout the breeding season. If one or more plovers are detected within the Action Area during any weekly survey, the following measures shall be adhered to:

a. Daily pre-activity plover surveys by a USFWS-Approved Biologist will be conducted in all suitable habitat. The USFWS-Approved Biologist will also remain on site during all work activities occurring within suitable plover habitat. If the USFWS-Approved Biologist determines that operations are resulting in a behavioral disturbance to existing plovers, or if one or more plovers move into the after work has commenced, work will stop immediately and not begin again until the USFWS-Approved Biologist has confirmed that the plovers have vacated the area.

   If an active plover nest is found within the Action Area, the USFWS-Approved Biologist shall place an 800-foot virtual construction-avoidance buffer zone around the nest, or some other size buffer mutually agreed to in consultation with the USFWS. A Project Proponent/Action Agency may choose to submit in their ESA Section 7(a)(2) Review Form their own analysis and buffer recommendations for consideration. The buffer zone will be delineated digitally (i.e., with no physical fencing or other physical demarcation) to avoid attracting attention to the nest. Work activities shall avoid nest site buffer zones until the USFWS-Approved Biologist determines that the young have fledged, or nesting activity has ceased (e.g., nest failure, predation of chicks). If modified measures are proposed due to site-specific constraints, the proposed activities may lead to adverse effects, including possible incidental take not to exceed the self-imposed take limit of death or injury of two individuals annually per recovery unit. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of occupied plover habitat.

b. Active nests found within the Action Area shall be monitored by the USFWS-Approved Biologist from a safe distance (i.e., far enough from nest to avoid disturbing adults or chicks) at least once per day to determine whether birds are exhibiting signs of stress (e.g., frequent flushing, failure to brood eggs or chicks) possibly due to work activities. Work activities that might, in the opinion of the USFWS-Approved Biologist, disturb nesting activities (e.g., excessive noise or visual disturbance) shall be prohibited within the buffer zone until such a determination is made.

c. Access to work sites within occupied nesting habitat will be by foot travel only, and workers will approach the nesting habitat directly from the wave slope (i.e., sand wetted by the last tidal cycle) using the shortest route possible, thereby minimizing visual disturbance to breeding plovers and dependent young. If a project requires vehicle or heavy equipment (e.g., excavators, bulldozers) use above the wave slope on any plover occupied beach, the vehicles or heavy equipment will only access the beach during daylight hours, and be limited to 5 mph or the minimal speed required to prevent becoming stuck in the sand, but never to exceed a speed of 15 mph. The USFWS-Approved Biologist will walk in front of the moving vehicle or heavy equipment (at a

safe distance) to ensure that no plovers are adversely affected. A short-term behavioral disturbance such as flushing would likely not result in an adverse effect to snowy plovers, however, repeated behavioral disturbances to the same birds may result in an adverse effect. Therefore, the USFWS-Approved Biologist should work to avoid or minimize repeat exposure to any given plover, to the extent practicable.

d. No night work (using artificial sources of lighting) may occur within occupied nesting habitat.

WSP-*6, Predator Avoidance.* 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 in occupied habitat. Trash and food will be contained in predator-proof containers and transported off site each day to avoid attracting plover predators to occupied nesting habitat. Project personnel shall not bring pets (i.e., dogs) to the construction site.

Coastal California Gnatcatcher

CAGN-1*, Habitat Assessment.* A habitat assessment will be conducted by a Qualified Biologist to determine whether suitable habitat (including foraging, nesting, and dispersal) for the gnatcatcher occurs in or adjacent to the project area. If suitable habitat for this species is identified in or adjacent to the project area and the proposed project may affect suitable habitat that is not known to be occupied by the gnatcatcher, the appropriate USFWS Office will be contacted regarding the need for surveys according to the USFWS protocol (USFWS 1997); and those surveys will be conducted, as appropriate. Alternatively, the Project Proponent may choose to implement the following avoidance measures for these species, based on the presence of suitable habitat, without conducting protocol surveys to confirm presence or absence.

CAGN-2*, Habitat Avoidance.* Project impacts will be avoided or minimized in coastal sage scrub, alluvial fan scrub, and other vegetation communities suitable for this species. If the Project Proponent made a determination that the habitat is occupied or that impacts to these habitats cannot be avoided, effects to gnatcatcher individuals will be avoided or minimized through implementation of the measures listed below.

CAGN-3*, Work Window.* To minimize effects to nesting gnatcatchers, all clearing of vegetation in occupied or identified gnatcatcher suitable habitat will occur outside the breeding season (February 15 through August 30). If the breeding season cannot be avoided, a USFWS-Approved Biologist will conduct preconstruction nesting bird surveys prior to vegetation removal. If no active gnatcatcher nests are found within a 300-foot disturbance buffer distance between noise-generating project activities and gnatcatcher nests, project activities may proceed. Noise buffer distances may be modified in coordination with the USFWS Field Office based on project specific characteristics or a Project Proponent/Action Agency may choose to submit their own analysis and buffer recommendations for USFWS consideration. If sufficient buffers cannot be implemented, the proposed activities may lead to adverse effects, not to exceed the self-imposed take limit of injury or mortality up to one nest annually and harm to no more than two individual coastal California gnatcatchers annually. Mortality to a nest would include disturbance to an

active nest with egg(s) or chick(s) in the nest or if fledglings are still dependent on the nest for survival. The self-imposed take limit also requires no net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.

CAGN-4*, Work Restrictions Near Active Nests.* If an active gnatcatcher nest is detected during the survey, either work will be suspended until the young have fledged/beginning of the nonbreeding season, or the following conditions will apply:

a. A USFWS-Approved Biologist will establish a 300-foot disturbance buffer distance between noise-generating project activities and gnatcatcher nests. Noise buffer distances may be modified in coordination with the USFWS Field Office based on project specific characteristics or a Project Proponent/Action Agency may choose to submit their own analysis and buffer recommendations for USFWS's consideration. If sufficient buffers cannot be implemented, the proposed activities may lead to adverse effects, including possible incidental take up to the program limit for this species (Table 8).

b. If a buffer is established, a Qualified Biologist will monitor the nest during construction for signs of adverse effects, including distress/disturbance. If adverse effects are detected, the Qualified Biologist will have the authority to stop all construction activities in the vicinity of the nest and implement additional protection or avoidance measures. Additionally, the USFWS-Approved Biologist will coordinate with the USFWS-Carlsbad Office to determine whether additional protection measures should be used to avoid or minimize effects on the nesting birds.

c. A Qualified Biologist will continue to monitor the nest and will determine when young have fledged (in coordination with a USFWS-Approved Biologist). Once the USFWS-Approved Biologist has confirmed that the young have left the nest, the buffer and exclusion zone may be removed, and construction activities within these areas may resume.

Marbled Murrelet

The following measures are those the USFWS considers most likely to be consistent with a not likely to adversely affect (NLAA) determination for the marbled murrelet. If modified measures are proposed, the proposed activities may lead to adverse effects, not to exceed the self-imposed take limit of injury or mortality to one nesting murrelet pair and their dependent young (one egg/chick per annual clutch) per recovery unit (Table 8).

MAMU-1*, Work Restrictions in Occupied Habitat*. If marbled murrelet surveys (using the 2003 USFWS survey protocol or the most updated version of this guidance document; Evans Mack et al. 2003) determine that the project area is occupied, or if USFWS presumes marbled murrelet occupancy without conducting surveys, the Project Proponent will adhere to the following Protection Measures. Surveyors are required to meet or exceed all training recommendations in Evans Mack et al. (2003) or the most updated version of this guideline document.

a. Vegetation Removal or Alteration of Known or Potential Nest Trees:

i. No potential marbled murrelet nest trees will be removed during any time of year. 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 inches in 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. Removal or damage of known or potential nest trees will be avoided. Project Proponents should seek technical assistance from the USFWS for known or potential nesting trees determined to be a "hazard tree," or otherwise identified for possible removal to implement the project. 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. Removal or damage of trees with potential nesting platforms will be avoided. A platform is a relatively flat surface at least 10 centimeters (4 inches) in diameter and 10 meters (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 alter suitable nesting habitat to the extent that it is no longer functioning.

v. Trimming or pruning of unsuitable nest trees or limbs, trimming or removal of brush, and felling of hazard trees in suitable habitat may occur outside of the nesting season.

b. Auditory, Visual, or Other Disturbance:

i. 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 in confirmed marbled murrelet nesting habitat during the majority of the murrelet nesting season (i.e., March 24 through August 5) (USFWS 2020a).

ii. Between August 6 (date when most murrelets have fledged in coastal northern California) and September 15 (end of murrelet nesting season) of any year, project activities, with adjacent suitable nesting habitat, that will generate sound levels ≥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 USFWS's guidelines (USFWS

2020a). 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

iii. The sound level restrictions mentioned above will be lifted after September 15; after which USFWS considers the above-ambient sound levels as having "no effect" on nesting murrelets or dependent young.

iv. No human activities shall occur within visual line-of-sight of 100 meters or less from a known nest location within the Action Area (USFWS 2020a), or from un-surveyed suitable nesting habitat containing potential murrelet nest trees within 100 meters of proposed activities.

v. Not to exceed the self-imposed take limit of injury or mortality to no more than one nesting murrelet pair and their dependent young (one egg/chick per annual clutch) per recovery unit.

MAMU-2*, Work Restrictions in Unoccupied Habitat*. If recent protocol surveys determine that all suitable marbled murrelet nesting habitat in the project area is considered unoccupied, the auditory, visual, and other disturbance measures listed in MAMU-1, do not apply. However, if marbled murrelet surveys (using the 2003 USFWS survey protocol or the most updated version of this guideline document; Evans Mack et al. 2003) determine that the project area is occupied, or if the Project Proponent presumes marbled murrelet occupancy without conducting surveys, the Project Proponent will adhere to the measures identified in *MAMU-1, Work Restrictions in Occupied Habitat*.

MAMU-3*, Work Restrictions in Marbled Murrelet Critical Habitat*. If a proposed project would result in modification to designated critical habitat for marbled murrelet, the Project Proponent will notify the FWS when submitting the ESA Section 7(a)(2) Review Form.

Northern Spotted Owl

NSO-1*, Inquire with USFWS on Northern Spotted Owl Data Records*. If the proposed project is in suitable nesting, roosting, or foraging (NRF) habitat for the northern spotted owl and may affect the northern spotted owl or its habitat, the Project Proponent will contact USFWS to obtain contact information for local USFS, County, or other biologists who can provide a northern spotted owl survey, Activity Center, and habitat suitability data for the project 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 project 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 northern spotted owl surveys have not been done or are not current in accordance with the 2012 Northern Spotted Owl Survey Protocol guidance (depending on activity), and surveys are planned, conduct surveys according to the 2012 Northern Spotted Owl Survey Protocol and 2019 guidelines revision and follow the seasonal restrictions described

below for "Surveyed Landscape" (USFWS 2012c; USFWS 2019a). If surveys are not planned, assume occupancy by nesting owls based on the presence of suitable NRF habitat; adhere to the guidance and seasonal restrictions described below for operating in an "Unsurveyed Landscape."

a. As an alternative to the full six-visit protocol surveys described in the 2012 Northern Spotted Owl Survey Protocol (USFWS 2012c), three surveys can be conducted in the year of action implementation if there have been two consecutive years of surveys with six visits per year in the immediately previous years. If no northern spotted owls are detected within 0.25 mile of the proposed activities, activities may proceed that year without seasonal restrictions (see ASP-5, Airborne Noise Reduction).

NSO-3*, Habitat Avoidance.* In all suitable NRF habitat:

i. Removal or damage of known nest trees and associated screen trees will be avoided, unless they must be removed to implement the proposed project or are a confirmed safety hazard according to the guidance documents from the implementing agency or another agency with jurisdiction in the project area.

ii. Removal or damage of trees or snags with potential nesting platforms and associated screen trees will be avoided. These include trees with large, flattened tops; large, broken-topped trees; trees with decadence, such as large cavities; mistletoe broom structures, catfaces, or large limbs; or large snags with these similar characteristics.

iii. Removal of large (20 inches in diameter at breast height or larger) snags will be avoided, unless they must be removed to implement the proposed project or are a confirmed safety hazard according to the implementing agency's guidance documents.

NSO-4*, Avoid Reducing Habitat Quality.* Project activities will not result in net loss of habitat or downgrade or remove the function of suitable NRF habitat to the degree that the habitat does not function in the capacity that existed prior to treatment:

a. Although habitat elements such as individual large trees or snags may be removed from NRF habitat, the treatment must not be so extensive as to downgrade or remove the overall function of the habitat.

NSO-5*, Avoid Foraging Habitat.* In suitable foraging habitat in northern spotted owl core areas (a 0.5-mile radius or 500-acre area around an Activity Center) and in suitable foraging habitat in northern spotted owl home ranges (a 1.3-mile radius, including core, or a 3,398-acre area around an Activity Center):

a. Downgrading or removal of suitable foraging habitat function will be avoided.

b. Although habitat elements—such as individual trees, shrubs, down logs, and snags—may be removed from foraging habitat, the treatment must not be so extensive as to downgrade or remove the overall function of the habitat in a northern spotted owl core or home range below the recommended habitat levels for supporting survival, reproduction, and

occupancy (USFWS 2011a). In the interior California Klamath and California Cascades Provinces, this level is a combination of 400 acres of suitable NRF habitat in the core. For the home range, the level is 40% suitable NRF (approximately 1,336 acres). In the Redwood zone, the recommended level is 100 acres of suitable NRF habitat in the core and 500 acres of suitable NRF habitat in the home range (FWS 2019a).

NSO-6*, Work Restrictions in Previously Surveyed Landscape.* If surveys are completed or are current for the project area (based on surveys conducted by the 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 (see ASP-5, Airborne Noise Reduction).

   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 northern spotted owl 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 through July 9. [16]

NSO-7*, Work Restrictions in Unsurveyed Landscape.* If surveys have not been completed and cannot be done, assume occupancy by nesting owls in the project 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 unsurveyed suitable NRF habitat** between February 1 and July 9 (see ASP-5, Airborne Noise Reduction).

   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.

[16] Not to exceed the self-imposed take limit of no more than 18 nesting individuals harmed from disturbance per year.

b. Do not conduct any suitable habitat modification or smoke-generating activities within 0.25 mile (or 1,320 feet) **of unsurveyed suitable NRF habitat** between February 1 and September 15.

   Suitable habitat includes northern spotted owl 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 through July 9.[17]

NSO-8*, Work Restrictions in Designated Critical Habitat.* When working in designated critical habitat, adhere to all measures described in NSO-5, NSO-6, and NSO-7 for reducing impacts in suitable NRF habitat. This will ensure that effects to physical and biological features related to NRF (as defined under the Revised Critical Habitat final rule 77 Federal Register 71876, USFWS 2012d) are minimized.[16]

Least Bell's Vireo

LBV-1*, Habitat Assessment.* A habitat assessment will be conducted by a Qualified Biologist to determine whether the project area contains suitable habitat (including foraging, nesting, and dispersal) for the least Bell's vireo. If suitable habitat for these species is identified in the project area and the proposed project may affect suitable habitat that is not known to be occupied by the least Bell's vireo, the appropriate USFWS Field Office will be contacted for technical assistance prior to submitting an ESA Section 7(a)(2) Review Form regarding the need for surveys according to USFWS protocols (USFWS 2001); and those surveys will be conducted, as appropriate. Alternatively, the Project Proponent may choose to implement the following avoidance measures for these species, based on the presence of suitable habitat, without conducting protocol surveys to confirm presence or absence.

LBV-2*, Habitat Avoidance.* Staging and temporary construction areas will be outside of suitable habitat and will use existing roads and developed areas to the maximum extent practicable. All mature riparian vegetation (e.g., willows and cottonwoods) greater than 30 feet in height will be avoided. If mature riparian vegetation cannot be avoided, it will be either transplanted elsewhere in or near the project area or placed horizontally or diagonally outside the project footprint, under the direction of a Qualified Biologist. Not to exceed the self-imposed take limit in Table 8, *Covered Species – Birds*.

LBV-3*, Work Window.* To minimize effects to nesting least Bell's vireos, all clearing of vegetation in occupied habitat or potential suitable habitat will occur outside the breeding season (September 16 through March 14). If the breeding season cannot be avoided, a USFWS-Approved Biologist will conduct preconstruction nesting bird surveys at least 48 hours before

[17] Not to exceed the self-imposed take limit of no more than 18 nesting individuals harmed from disturbance per year.

and no more than 1 week prior to vegetation removal. If no active nests are found in the project area, project activities may proceed.

LBV-4*, 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 nonbreeding season or the following will apply:

- An exclusionary buffer of 500 feet will be established around the nest and will be maintained between noise-generating project activities and nest's location. Noise buffer distances may be modified in coordination with the USFWS Field Office based on project specific characteristics or a Project Proponent/Action Agency may choose to submit their own analysis and buffer recommendations for USFWS's consideration. If sufficient buffers cannot be implemented, the proposed activities may lead to adverse effects, not to exceed the self-imposed take limit of injury or mortality of up to eight individuals and four nests annually. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of an occupied pairs' territory. The self-imposed take limit also requires no net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.

- A Qualified Biologist will monitor the nest during construction for signs of adverse effects, including distress/disturbance. If adverse effects are detected, then the Qualified Biologist will have the authority to stop all construction activity near the nest. The USFWS-Approved Biologist will identify additional measures to protect the nest and will coordinate with the applicable USFWS Office regarding additional protection measures to avoid or minimize effects on the nesting birds. Construction may resume only with approval from USFWS-Approved Biologist; AND

- The Qualified Biologist, in coordination with the USFWS-Approved Biologist, will continue to monitor the nest and will determine when young have fledged. Once the USFWS-Approved Biologist has confirmed that the young have left the nest, the buffer and exclusion zone may be removed and construction activities in these areas may resume. OR

- If construction must occur in the buffer and exclusion zones, the appropriate USFWS Field Office will be contacted to determine what additional measures may be necessary to avoid and/or minimize effects to these species.

Southwestern Willow Flycatcher and Yellow-Billed Cuckoo (Western US DPS)

SWWF-YBC-1*, Habitat Assessment.* A habitat assessment will be conducted by a Qualified Biologist to determine whether suitable habitat (including foraging, nesting, and dispersal) for the flycatcher or cuckoo 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, the respective USFWS Field Office/S7 Delegated Authority Program will be contacted regarding the need for surveys according to USFWS protocol (USFWS 2001; Sogge et al. 2010; and Halterman et al. 2015) and those surveys will be conducted, as

appropriate. Otherwise, if the respective USFWS Field Office/S7 Delegated Authority Program agrees based on other biological data or reasoning, subsequent avoidance and minimization measures for these species will be implemented.

SWWF-YBC-2, *Habitat Buffer.* A noise disturbance buffer of 500 feet will be maintained between noise-generating project activities and occupied or assumed occupied Southwestern willow flycatcher or yellow-bill cuckoo habitat. Noise buffer distances may be modified in coordination with the USFWS Field Office based on project specific characteristics or a Project Proponent/Action Agency may choose to submit their own analysis and buffer recommendations for USFWS consideration. If sufficient buffers cannot be implemented, the proposed activities may lead to adverse effects, which are not covered under this consultation.

SWWF-YBC-3, *Minimizing Suitable Habitat Adverse Effects.* No permanent or temporary loss of native flycatcher or cuckoo occupied or presumed occupied habitat, or nonnative vegetation that supports essential breeding, feeding, and sheltering behaviors (e.g., tamarisk that supports willow flycatcher nesting), will occur (within or outside of the breeding season), unless determined to be insignificant at the project level.

SWWF-YBC-4, *Minimizing and Avoiding Critical Habitat Adverse Effects.* No permanent loss of designated critical habitat will occur, unless determined to be insignificant at the project level.

2.1.5.3.5. Mammals

There are four federally-listed mammal species that are being addressed in this PBO. A list of these mammal species is provided in Table 8.

General Mammal Protection Measures

There are no General Mammal Protection Measures identified in this section; however, measures are provided in this section for covered mammal species as identified in Table 8. Some of those measures for Covered mammals were grouped based on similar life history patterns and habitat requirements. Furthermore, several GPMs would reduce potential effects on these species. These measures include but are not limited to GPM2, *Construction Work Windows*; GPM3, *Construction Hours*; GPM4, *Environmental Awareness Training*; GPM5, *Environmental Monitoring*; GPM6, *Work Area and Speed Limits*; GPM7, *Environmentally Sensitive Area and/or Wildlife Exclusion*; ASP1, *Qualifications of the Qualified Biologist and USFWS-Approved Biologist*; ASP2, *Preconstruction Surveys; ASP-5, Airborne Noise Reduction*; GPM18, *Species Capture, Handling, and Translocation*; GPM19, *Entrapment Prevention*; WQHM3, *Erosion Control Plans*; WQHM4, *Hazardous Materials Management and Spill Response Plan*; and VHDR6 and VHDR7 (for herbicide use).

Table 8: Covered Species – **Mammals**
Self-Imposed Annual Take Limits and Effects Determinations

Common Name	Annual Take Limits	ESA Effects Individuals	ESA Effects Critical Habitat
riparian (=San Joaquin Valley) woodrat	Injury or mortality of no more than 2 individuals annually. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a population in the project area.	LAA	Not Applicable
riparian brush rabbit	Injury or mortality of no more than 2 individuals annually. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a population in the project area.	LAA	Not Applicable
salt marsh harvest mouse	Injury or mortality of no more than 2 individuals and 1 nest equivalent annually. 1 nest equivalent is equal to all young within the nest or 4 total juveniles if a nest is not found. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a population in the project area. No net loss of habitat through implementation of protection measures and/or offsetting impacts with habitat restoration or enhancement.	LAA	Not Applicable
San Bernardino Merriam's kangaroo rat	Not Applicable	NLAA	LAA

Notes:

Limits reset on January 1 each year. Limits apply to the entire range of the species (range-wide), unless otherwise indicated.

San Bernardino Merriam's Kangaroo Rat

KRAT-1, *Conduct Habitat Assessment*. Prior to beginning project activities, a Qualified Biologist will conduct a habitat assessment in potentially suitable habitat in the project footprint to determine presence of kangaroo rat burrows or their sign (e.g., scat, tail drags and tracks, or skeletal remains in owl pellets). The habitat assessment surveys will be conducted within 60 days, and at least 14 days prior to the start of ground-disturbing activities. If no burrows or sign of kangaroo rats are detected, no further measures will be required.

KRAT-2*, Habitat Buffer.* An exclusionary buffer will be established between noise-generating project activities and occupied, or presumed occupied, habitat. The buffer distance will be determined by the USFWS-Approved Biologist in coordination with the respective USFWS Field Office/S7 Delegated Authority Program. A Project Proponent may choose to submit in their ESA Section 7(a)(2) Review Form with their own analysis and buffer recommendations for the USFWS' consideration.

KRAT-3*, Avoidance Areas*. Based on the results of the habitat assessment and if the exclusionary buffer established by KRAT-2, Habitat Buffer is not sufficient to include the distances described in 3a-3f, in areas where kangaroo rats are present or assumed present,[18] non-disturbance zones will be established prior to ground-disturbing activities.

a. Environmentally Sensitive Areas and/or Wildlife Exclusion (GPM-7) will be done in coordination with a USFWS-Approved Biologist around potentially suitable habitat within the project site boundaries, so that the potentially suitable habitat can be avoided during ground-disturbing activities. Barriers used will not involve trenching.

b. The contractor will maintain the avoidance zones around active burrows identified by a USFWS-Approved Biologist, with a minimum radius of 50 feet measured outward from the burrow entrance or cluster of entrances.

c. Actions in avoidance zones will be limited to essential vehicle and equipment operation on existing authorized roads and foot traffic. Actions in avoidance zones will be confined to daylight hours unless, at the discretion of the USFWS, operations at other times of day would be beneficial to kangaroo rats.

d. The avoidance zone radius may be altered in consultation with the USFWS, based on publication of new guidance, sensitivity of the site, proximity of existing disturbance, or other factors.

e. If project activities will take place within 50 feet of existing burrow entrances and, in the judgment of the USFWS-Approved Biologist, the combination of soil hardness and

[18] The Project Proponent will assume a species is present in an area when suitable habitat is present within the current range of the species and their absence has not been determined by a negative finding using protocol level surveys.

activity impact is not expected to collapse those burrows, then those project activities may take place under the supervision of the USFWS-Approved Biologist.

f. Activities authorized by the USFWS-Approved Biologist within 50 feet of burrow entrances will be documented and reported to USFWS.

KRAT-4*, Minimizing Suitable Habitat Adverse Effects.* No permanent or temporary loss of San Bernardino kangaroo rat occupied or presumed occupied habitat will occur unless take can be avoided and effects to the habitat are determined to be insignificant at the project level.

KRAT-5*, Minimizing and Avoiding Critical Habitat Adverse Effects.* No permanent loss of designated critical habitat will occur, unless determined to be insignificant at the project level.

Riparian Woodrat and Riparian Brush Rabbit

RW-RBR-1, *Habitat Assessment and Surveys*. Prior to implementing proposed vegetation-altering or ground-disturbing activities, a Qualified Biologist will conduct a field evaluation of suitable habitat for both species, for all covered activities that could occur in suitable habitat for these species in the project area. If the project cannot fully avoid effects on suitable habitat, species presence would be assumed. If the Project Proponent is interested in conducting protocol-level surveys to confirm presence or absence, in accordance with the USFWS *Habitat Assessment Guidelines and Survey Protocol for the Riparian Brush Rabbit and the Riparian Woodrat,* pre-approval by the USFWS for such work is required via the ESA Section 7(a)(2) Review Form process.

RW-RBR-2, *Habitat Avoidance (Occupied Habitat).* If occupied riparian woodrat or riparian brush rabbit habitat is present, or the habitat is assumed to be occupied, the Project Proponent will establish avoidance areas as follows:

- Project activities will be isolated from suitable riparian habitat that contains rabbit dens or woodrat middens, using ESAF.
- If lighting is required during construction, all lights will be screened, and directed down toward work activities and away from riparian habitat that is occupied or assumed to be occupied. A USFWS-Approved Biologist will ensure that lights are properly directed at all times.
- Not to exceed the self-imposed take limit of injury or mortality to no more than two individuals. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a population in the project area.

RW-RBR-3, *Habitat Avoidance (Unoccupied Suitable Habitat*). If the suitable habitat is determined through surveys to be unoccupied, Project Proponent will implement the following measures (as appropriate) to minimize long-term effects on the habitat, and to allow the proposed project to provide for the recovery of the species:

- Floodplain restoration projects will be designed to minimize the removal of mature native vegetation in areas providing suitable habitat.
- Refugia from flood events in the restored floodplains will be included for individuals of these species that may come to occupy the area. Design considerations for refugia include distance between refugia (or travel time for target species to reach refugia), size of refugia (or ability of vegetation on refugia to provide cover and support nutritional needs of target species throughout flood season), connectivity of refugia to permanent high ground (for target species to escape from flooding), and/or accessibility by boat (to allow resource managers access to refugia if needed).

Salt Marsh Harvest Mouse

SMHM-1, *Vegetation Removal, Other Construction Activities, and Monitoring.* The following measure will be implemented to avoid and minimize effects to the salt marsh harvest mouse where construction activities would occur in suitable habitat within the current range of the species:

a. Potential adverse effects from project-related noise should be avoided or minimized to the maximum extent practicable by implementing sufficient disturbance buffers between noise-generating project activities and salt marsh harvest mouse habitat. Sufficient buffer distances can be determined in coordination with the USFWS. A Project Proponent/Action Agency may choose to submit their own analysis and buffer recommendations for the USFWS' consideration. If sufficient buffers cannot be implemented, the proposed activities may lead to adverse effects, including possible incidental take up to the program limits provided in Table 8, *Covered-Species – Mammals*.

b. A USFWS-Approved Biologist will identify suitable habitat prior to initiating construction; a Qualified Biologist or USFWS-Approved Biologist will be on site during all construction activities, including vegetation removal.

c. Disturbance to suitable habitat on levees and upland areas will be minimized. Vegetation will be cleared from all areas to be excavated, and where spoils will be deposited.

d. Vegetation will be removed from the work area and within a 15-foot buffer on both sides of the work area. Vegetation removal will be conducted using handheld motorized equipment (e.g., string trimmers and fixed-blade weed trimmers) unless the project site is not conducive to clearing in this manner, in which case other methods for clearing will be proposed in the Project ESA Section 7(a)(2) Review Form. Vegetation will be cleared under the direction of the USFWS-Approved Biologist in a manner that minimizes potential to kill or injure salt marsh harvest mice (e.g., cut in multiple passes, removed systematically from one area toward another to direct retreat, or other approaches). If harvest mice are encountered during vegetation clearing or other activities, work will be halted until the individual has left the area on

its own or until the USFWS-Approved Biologist walks the marsh ahead of the vegetation clearing to try and haze the mice out; due to the difficulty with field identification of salt marsh harvest mice, this will apply to all harvest mice.

e. Cut vegetation will be immediately removed from the cleared area as it is being cut, so that no standing or cut vegetation remains in the cleared area.

f. Vegetation removal will not occur during extreme high tides (6.5 feet or higher), when mice may be seeking refuge, to allow salt marsh harvest mice to access areas for refugia.

g. Construction will commence in cleared areas no less than 48 hours after vegetation clearing is completed at each given location.

h. Construction activities will be limited to 1 hour after sunrise to 1 hour before sunset.

i. Post-construction annual disturbance to vegetation in suitable habitat will be minimized and avoided when performing long-term monitoring and management activities.

j. Not to exceed the self-imposed take limit of injury or mortality of no more than two individuals and one nest equivalent. One nest equivalent is equal to all young within the nest or four total juveniles if a nest is not found. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a population in the project area. No net loss of habitat through implementation of protection measures and/or offsetting impacts with habitat restoration or enhancement.

2.1.5.3.6. Invertebrates

There are ten federally-listed invertebrate species being addressed in this PBO. A list of these invertebrate species is provided in Table 9. Species Protection Measures are provided in this section for individual species to avoid or minimize potential adverse effects.

Table 9: Covered Species **– Invertebrates**
Self-Imposed Annual Take Limits and Effects Determinations

Common Name	Annual Take Limits	ESA Effects Individuals	ESA Effects Critical Habitat
California freshwater shrimp	No more than 3% of captured and relocated individuals killed per project.	LAA	Not Applicable

Common Name	Annual Take Limits	ESA Effects Individuals	ESA Effects Critical Habitat
conservancy fairy shrimp	No more than 10% temporary habitat loss per occupied pool. This limit can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS FO, via the ESA Section 7(a)(2) Review Form Process.	LAA	LAA
longhorn fairy shrimp	No more than 10% temporary habitat loss per occupied pool. This limit can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS FO, via the ESA Section 7(a)(2) Review Form Process.	LAA	LAA
Mount Hermon June beetle	No more than 20 individuals injured or killed annually.	LAA	Not Applicable
Riverside fairy shrimp	No more than 10% temporary habitat loss per occupied pool. This limit can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS FO, via the ESA Section 7(a)(2) Review Form Process.	LAA	LAA
San Diego fairy shrimp	No more than 10% temporary habitat loss per occupied pool. This limit can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS FO, via the ESA Section 7(a)(2) Review Form Process.	LAA	LAA
Smith's blue butterfly	No more than 25 host plants lost annually.	LAA	Not Applicable
valley elderberry longhorn beetle	No more than 50 shrubs lost annually.	LAA	LAA

Common Name	Annual Take Limits	ESA Effects Individuals	ESA Effects Critical Habitat
vernal pool fairy shrimp	No more than 10% temporary habitat loss per occupied pool. This limit can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS FO, via the ESA Section 7(a)(2) Review Form Process.	LAA	LAA
vernal pool tadpole shrimp	No more than 10% temporary habitat loss per occupied pool. This limit can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS FO, via the ESA Section 7(a)(2) Review Form Process.	LAA	LAA

Notes:

Limits reset on January 1 each year. Limits apply to the entire range of the species (range-wide), unless otherwise indicated.

LAA = ESA determination of may affect, and is likely to adversely affect

General Invertebrate Protection Measures

No General Invertebrate Protection Measures were identified. However, there are several GPMs that would reduce potential effects on these species. These measures include but are not limited to GPM-2, *Construction Work Windows*; GPM-4, *Environmental Awareness Training*; GPM-5, *Environmental Monitoring*; GPM-6, *Work Area and Speed Limits*; GPM-7, *Environmentally Sensitive Area and/or Wildlife Exclusion Fencing*; GPM-12, *Fugitive Dust Reduction*; ASP-1, *Qualifications of the Qualified Biologist and USFWS-Approved Biologist*; ASP-2, *Preconstruction Surveys*; ASP-3, *Species Capture, Handling, and Translocation*; and VHDR-6 and VHDR-7 (for herbicide use).

California Freshwater Shrimp

CAFS-1, *Preconstruction Survey.* A USFWS-Approved Biologist will conduct surveys of suitable habitat in the project 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. The USFWS-Approved Biologist will determine whether a visual survey of habitat is adequate to confirm the need for CAFS-4, or whether aquatic sampling is needed, and will implement the survey accordingly.

CAFS-2, *Work Window.* No work is permitted during wet weather or where saturated ground conditions exist; if a 60% chance of 0.5 inch of rain, or more, within a 24--hour period is forecast, then operations will cease until 24 hours after rain has ceased.

CAFS-3, *Site Access Restrictions.* New access routes requiring tree removal and grading will be limited to the extent practicable. Access routes will not be along the top of the stream bank, but relatively perpendicular (45 to 90 degrees is acceptable) to the bank. 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-4, *Capture and Relocation.* If California freshwater shrimp must be temporarily excluded from portions of the project area during in-water work, a project-specific capture and relocation plan should be submitted to USFWS for review and approval. It is recommended that the capture and relocation plan be provided to USFWS with the ESA Section 7(a)(2) Review Form to avoid delays in project implementation. The following procedures should be considered during development of the plan:

a. Prior to any California freshwater shrimp handle/capture activities, the USFWS 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-inch Dframe net] or small minnow dip nets), relocated out of the work area in the net or placed in buckets containing stream water, and moved directly to the nearest suitable habitat in the same branch of the creek. To minimize holding time, suitable habitat will be identified prior to capturing California freshwater shrimp. 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 USFWS-Approved Biologist has determined that all shrimp have been effectively relocated, barrier seines or exclusion fencing with mesh no greater than 5 millimeters will be installed to prevent shrimp from moving back in, as appropriate.

d. Capture, handling, and monitoring of California freshwater shrimp will be conducted by a USFWS-Approved Biologist, with assistance as necessary from another Qualified Biologist, to safely and effectively complete the task. The USFWS-Approved Biologist will take the lead on all capture, handling, and monitoring and will at all times be present and in direct supervision of any supporting Qualified Biologist(s). The USFWS-Approved Biologist will report the number of captures, releases, injuries, and mortalities to the USFWS within 30 days of project completion.

e. Not to exceed the self-imposed take limit of no more than 3% of captured and relocated individuals injured or killed per project.

CAFS-5*, Dewatering.* The Project Proponent will minimize the potential for California freshwater shrimp to be entrained during dewatering activities. Pump intakes will be placed away from complex vegetated banks that may contain habitat for California freshwater shrimp. Screens will be used during dewatering, in accordance with IWW-6, *Dewatering/Diversion*, and following CDFW (2001) and NMFS (1997) criteria for fry-sized salmonids (e.g., approach velocity will not exceed 0.33 foot per second in streams).

CAFS-6*, Habitat Protection.* Disturbance to low-velocity pool and run habitats occupied by shrimp, including all areas with undercut banks or vegetation overhanging into the water, will be avoided to the extent practicable. Disturbance and removal of aquatic vegetation will be minimized to the extent practicable. There will be no net loss of large woody debris in the 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 greater than 3 inches in diameter at breast height will be left in place as is practicable, and the canopy cover provided by hardwoods or conifers will not be reduced unless necessary for access or other unforeseen circumstance. To the extent practicable when vegetation removal is required, willow crowns and roots will be left in place to allow for post-construction resprouting and reestablishment. Downed trees, stumps, and other habitat features and refuges in aquatic habitats will remain undisturbed as much as possible.

CAFS-7*, Rehabilitate Disturbed Habitat.* The stream bank will be planted with species that 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. Plantings may include widely spaced trees, willow sprigs and sedges near the water's edge, and plantings of herbaceous plant species to fill in gaps and augment existing habitat.

Mount Hermon June Beetle

MHJB-1*, Species Handling and Relocation*. Prior to construction, a USFWS-Approved Biologist will conduct construction crew training, in which individuals involved in construction will be provided a brief presentation about the biology of the Mount Hermon June beetle and shown pictures of the species during its various life stages in order to aid in its identification during construction. Construction personnel will be directed to cease work immediately and contact the USFWS-Approved Biologist to capture and relocate Mount Hermon June beetles, should one be observed within the project site. The Biologist will conduct regular inspections of the project site during construction to salvage and relocate individuals. Any potential larva or adult Mount Hermon June beetles encountered in an area that would be impacted by the proposed project will be relocated to intact habitat outside the impact area and re-buried at the approximate depth at which it was unearthed. If the Mount Hermon June beetle is found on the soil surface, then it will be relocated to a portion of the project site outside of the impact area and left on the soil surface in a location protected by vegetation.

Not to exceed the self-imposed take limit of no more than 20 individuals injured or killed annually.

MHJB-2*, Work Windows*. If ground disturbing activities are conducted during the flight season of the Mount Hermon June beetle (May 15 to August 15), suitable impervious materials will be placed over exposed soil by 7:00 p.m. each night to prevent dispersing males from burrowing and being impacted by subsequent soil disturbance.

MHJB-3, *Lighting*. No new outdoor lighting will be installed.

MHJB-4*, Landscaping Elements*. Landscaping elements, associated with restoration, that can degrade Mount Hermon June beetle habitat, will not be used. This includes elements such as turf grass, dense ground cover, weed matting, aggregate, and mulch.

Vernal Pool Branchiopoda

All vernal pool shrimp species, among the Covered Species, belong to the Branchiopoda class of crustaceans. Vernal pool fairy shrimp, conservancy fairy shrimp, longhorn fairy shrimp, Riverside fairy shrimp, and San Diego fairy shrimp all belong to the order Anostraca; however, vernal pool tadpole shrimp belong to the order Notostraca. Thus, when referring to all covered vernal pool animal species, the term Branchiopoda will be used.

Because proposed restoration projects intended to restore vernal pool habitat or restore habitat adjacent to vernal pools will be designed to protect or restore vernal pool ecosystems whether Covered Species are currently present or not, preconstruction surveys are not required, but are highly recommended. Proposed projects will follow the avoidance and minimization measures listed below to protect Covered vernal pool Branchiopoda, if present, and to protect suitable habitat even if Covered Species are not present. If a Project Proponent believes that their project would be best implemented following a finding of absence of Covered Species, the Project Proponent may conduct surveys following the USFWS (USFWS 2017a) (or most recent version) survey protocol, which can be used to demonstrate presence or absence of covered vernal pool Branchiopoda. Based on that finding, the Project Proponent may propose alternate measures that meet the intent of measures included below for USFWS review and approval when submitting their ESA Section 7(a)(2) Review Form. Otherwise, all Project Proponents will follow the measures described below to protect vernal pool Branchiopoda and their habitat.

Vernal Pool Branchiopoda Protection Measures 1 through 9 apply to all projects but because VPBR-9(i) allows this 10% limit to be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS Field Office, via the ESA Section 7(a)(2) Review Form process, some of the Vernal Pool Branchiopoda Protection Measures below may not be applicable. In such cases, the USFWS Field Office will work the Project Proponent to identify project specific vernal pool species protection measures in order to minimize impacts during the restoration project.

VPBR-1, *Work Window.* Work within 250 feet of suitable Covered vernal pool Branchiopoda habitat (e.g., vernal pools or seasonal wetlands) will be performed between June 1 and October 15[19] under dry site conditions.

VPBR-2, *Biological Monitor.* A Qualified Biologist will monitor construction activities, as described in GPM5, Environmental Monitoring as well as all activities within 250 feet of suitable habitat for Covered vernal pool Branchiopoda, if encroachment on the 250-foot buffer described in VPBR3 is necessary.

VPBR-3, *Work Restrictions During the Wet Season.* Work should be planned to take place during the dry season whenever possible. If the Project Proponent determines that construction activities must occur during the October 15 through June 1 wet period, the ESAF and erosion control materials will be placed around vernal pools and other seasonal wetlands, as determined by the Qualified Biologist, to avoid sedimentation into vernal pool habitat or alteration of site hydrology. The fencing will provide a buffer between construction activities and the vernal pools and other seasonal wetlands. The Qualified Biologist will oversee the installation and maintenance of the fencing and monitor its integrity during construction, so that repairs can be made in a timely manner. If a 60% chance of 0.25 inch of rain or more within a 24-hour period is forecast, then operations will cease until 48 hours after rain has ceased. There will be no off-road traffic or other activities during the wet season in the vernal pool watershed that could negatively alter the hydrology of the vernal pool (e.g., by creating road ruts).

VPBR-4, *Site Restrictions.* 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

b. Mixing of pesticides, herbicides, or other potentially toxic chemicals

Nondisturbance exclusion zones will be established, maintained, and monitored by a Qualified Biologist. The Qualified Biologist will ensure that construction activity does not incidentally take vernal pool Branchiopoda or adversely impact their habitat outside of the project footprint, in areas where suitable habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur.

VPBR-5, *Erosion Control.* Any vernal pool, vernal pool grassland, or seasonal wetland will be protected from siltation and potentially contaminated runoff from construction equipment by use of erosion control measures. Erosion-control measures will be placed between the outer edge of the 250-foot buffer and the activity area.

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[19] Extended or alternative work windows may be considered on an individual project basis with prior approval from USFWS ES, provided the Project Proponent can demonstrate that measures implemented to avoid or minimize exposure would do so at a level commensurate with the standard work windows.

VPBR-6*, 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-stormwater discharge. No application of water for dust suppression or other purposes will occur within or adjacent to vernal pool habitat without additional measures in place such as barriers and use of low flow water truck nozzles to keep water out of potential vernal pool Branchiopoda habitat during the dry season.

VPBR-7*, Prevent Hybridization.* To limit the potential for hybridization among related but geographically isolated Branchinectids through transport of their cysts, all equipment will be washed and kept clean of dirt, debris, and plant matter before entering the project area.

VPBR-*8, Herbicide Application, Clearing, and Ground Disturbance Near Vernal Pools.*

a. **Work Near Vernal Pools During the Dry Season**: A Qualified Biologist will flag or monitor all project implementation activities during the dry season (generally June 1 through October 15) within 250 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:

    i. Hand-held herbicide application is prohibited in the pool or at the edge of the pool (as determined by the Qualified Biologist and indicated by features such as hydrophilic plants and topography).

    ii. Power spray herbicide application is prohibited within 100 feet of the edge of the pool.

    iii. Broadcast herbicide application is prohibited within 150 feet of the edge of the pool.

b. **Work Near Vernal Pools During the Wet Season:** A Qualified Biologist will flag or monitor all project implementation activities during the wet season (generally October 1 through June 1) within 150 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:

    i. Hand-held herbicide application is prohibited within 25 feet of the edge of the pool (as determined by the Qualified Biologist and indicated by features such as hydrophilic plants and topography).

    ii. Power spray herbicide application is prohibited within 100 feet of the edge of the pool.

    iii. Broadcast herbicide application is prohibited within 150 feet of the edge of the pool.

    iv. Manual clearing of vegetation is prohibited at the pool or within the edge.

    v. Mechanical clearing of vegetation is prohibited within 100 feet of the edge of the pool.

vi. Nonmechanical ground-disturbing activities that are conducted by hand or with hand tools are prohibited within 50 feet of the edge of the pool.

VPBR-9*, Ground Disturbance in Vernal Pools*. If the intent of a Proposed Restoration Project is to improve habitat for Covered Species of vernal pool Branchiopoda (e.g., enlarge, deepen, repair, or otherwise modify suitable aquatic habitat), and would require ground disturbance in suitable habitat, the Project Proponent will submit detailed project design information for review and approval by the USFWS Field Office in the ESA Section 7(a)(2) Review Form. Any ground-disturbing activities within 25 feet of the edge of the pool will be conducted consistent with a plan reviewed and approved by the USFWS Field Office and will be conducted during the dry season. The following measures may also apply and should be considered during development of the plan:

a. If inoculum from an existing site will be used for restoration/enhancement, the plan will identify any proposed donor pools and include documentation that the pools are free of versatile fairy shrimp (*Branchinecta lindahli*). No more than 5% of the basin area of any donor pool will be used for collection of inoculum.

b. Restoration plans that include grading or regrading of vernal pools will include all final specifications and topographic-based grading, planting, and watering plans for the vernal pools, watersheds, and surrounding uplands (including adjacent mima mounds) at the restoration sites. The grading plans will also show the watersheds of extant vernal pools, and overflow pathways that hydrologically connect the restored pools in a way that mimics natural vernal pool complex topography/hydrology.

c. Restoration plans that include grading or regrading of vernal pools will include a hydraulic analysis that shows each proposed vernal pool and its watershed, and a calculation showing vernal-pool-to-watershed ratio. The vernal-pool-to-watershed ratio will be similar to extant pools closest to the restoration area.

d. Prior to ground disturbance in suitable habitat, loose substrate, which may include cysts of Branchiopoda, will be collected from the pool area to be disturbed by vacuum and stored in dry conditions until grading is complete. All collected substrate that may contain cysts of Branchiopoda will be temporarily stockpiled onsite, maintained in ambient conditions, and protected from rain and wind for subsequent redeposition in restored vernal pool areas.

e. Topsoil will be removed and stockpiled separately.

f. Disturbance of the less permeable, hardpan or claypan soil layer that often helps form vernal pools will be minimized. If the less permeable layer must be removed, it will be stockpiled separately.

g. When grading is complete, layers will be replaced in the reverse of the order in which they were removed; replacement will begin with subsoil, followed by the less permeable layer, then topsoil, and then loose material collected by vacuum. Subsoil and less

permeable layers should each be compacted following placement to decrease permeability of restored or modified suitable habitat.

h. Any groundwater encountered in excavations within vernal pool habitats during dry season work will be pumped into a water truck and discharged offsite or discharged in areas onsite where it will not migrate back into these habitats.

i. Not to exceed the self-imposed take limit of no more than 10% temporary habitat loss per occupied pool. However, some vernal pools are so degraded that extensive enhancement activities are needed. Thus, this limit can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS FO, via the ESA Section 7(a)(2) Review Form Process.

Valley Elderberry Longhorn Beetle

VELB-1, *Protocol Implementation*. For the valley elderberry longhorn beetle, the Project Proponent will be required to follow the Protection Measures presented in the *May 2017 USFWS Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle*, or the most updated version of this guideline document (USFWS 2017b). The Project Proponent must implement the valley elderberry longhorn beetle Framework on projects that may affect valley elderberry longhorn beetle. If elderberry shrubs occur on or within 50 meters (165 feet) of the project area, adverse effects to valley elderberry longhorn beetle may occur as a result of project implementation. If the project may affect valley elderberry longhorn beetle or its habitat, the applicable Species Protection Measures identified in the Framework will be followed as a requirement for ESA compliance. Because not all measures may be appropriate for every project, Project Proponents will identify the measures that are applicable to their specific project through technical assistance with the appropriate USFWS Field Office prior to submitting an ESA Section 7(a)(2) Review Form for coverage under the PBO.

Not to exceed the self-imposed take limit of no more than 50 shrubs lost annually.

VELB-2, *Elderberry Plantings.* When the project includes riparian plantings and is in the range of the VELB, include elderberry seedlings in the planting mix.

General Butterfly Protection Measures

The following General Butterfly Protection Measures apply to Smith's blue butterfly and should be considered for inclusion in the project (via the ESA Section 7(a)(2) Review Form). In addition, there are several GPMs that would reduce potential effects to these species. These measures include but are not limited to GPM-2, *Construction Work Windows*; GPM-4*, Environmental Awareness Training*; GPM-5, *Environmental Monitoring*; GPM-7, *Environmentally Sensitive Area and/or Wildlife Exclusion*; GPM-12*, Fugitive Dust Reduction*; ASP-2*, Preconstruction Surveys*; WQHM-3, *Erosion Control Plans*; and VHDR-6 and VHDR-7 (for herbicide use).

Butterfly-1, *Preconstruction Survey.* The Project Proponent will implement the following measures, depending on the time of year for project construction:

a. During the nonflight season (Table 11), preconstruction surveys for caterpillars and the larval host plants will be conducted during the typical bloom season. A Qualified Biologist, able to identify the larval host plants and caterpillars of Smith's blue butterfly, will conduct at least one and as many as three surveys prior to the start of construction to determine the use of the site by Smith's blue butterfly.

b. During the flight season (Table 11), preconstruction surveys for Smith's blue butterfly and the larval host plants will be conducted. A Qualified Biologist, able to identify the butterflies and their host plants, will conduct as many as three surveys prior to the start of construction, to determine the use of the site by Smith's blue butterfly. If flight surveys are not possible, the butterfly species associated with the larval host plant will be assumed to be present.

Table 10: Covered Species – **Butterflies**

Butterfly Species	Adult Butterfly Flight Season	Host Plants	Larval Host Plant Typical Bloom Season
Smith's blue butterfly	Mid-June to early September, depending on the blooming period of Eriogonum.	Coast buckwheat (*Eriogonum latifolium*) and seacliff buckwheat (*E. parvifolium*). Adults may also take nectar from naked buckwheat (*E. nudum*).	June through September (coast buckwheat); year-round (seacliff buckwheat).

Butterfly-2, *Site Restrictions.* Access routes, staging areas, and total project footprint in butterfly habitat will be limited to the minimum necessary to achieve the project goal.

Butterfly-3, *Biological Monitor.* Biological monitoring will be overseen by a USFWS-Approved Biologist. During the adult flight season of Smith's blue butterfly (see Table 10), a Qualified Biologist will be present when construction activities occur in or within 150 feet of suitable habitat (dispersal habitat as well as areas containing the larval host plant and adult food plants). During monitoring, the Qualified Biologist will monitor for Smith's blue butterfly species, inspect the fencing/flagging, and immediately notify the resident engineer (or their designated contact) to address any necessary fencing/flagging repairs.

Butterfly-4, *Environmentally Sensitive Areas.* Any larval food or host plants found within 300 feet of the project footprint will be clearly marked.

a. For projects where Smith's blue butterfly species are present or assumed to be present, larval food or host plants will be avoided to the maximum extent practicable (see Table 10).

b. For all projects where Smith's blue butterfly are present or assumed to be present, prior to any ground-disturbing or vegetation removal activities, the edge of the work area near any larval food or host plants will be clearly marked in coordination with a USFWS-Approved Biologist to prevent workers and vehicles from entering this area.

c. A Qualified Biologist will supervise the installation of fencing/flagging around stands of known Smith's blue 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 fencing/flagging will be field-adjusted by the Qualified Biologist, as necessary. The temporary fencing/flagging will be furnished, constructed, maintained, and later removed on completion of the project. Temporary fencing/flagging will be at least 4 feet high and constructed of high-visibility material (e.g., orange, commercial-quality woven polypropylene or similar material). No heavy equipment will be permitted in the fenced/flagged area. Warning signs indicating the sensitivity of the area will be attached to the fencing/flagging.

d. Not to exceed the self-imposed take limit of no more than 25 host plants lost annually.

Butterfly-5, *Dust Control.* The Qualified Biologist will ensure that dust is controlled by construction personnel by periodically watering down areas within 100 feet of Smith's blue butterfly habitat, as necessary. Watering down the construction area will prevent dirt from becoming airborne and accumulating on larval host plants and adult food source plants for Smith's blue butterfly. See GPM-12, *Fugitive Dust Reduction*, for further information on dust control.

Butterfly-6, *Encounters with Species*. If one or more adult Smith's blue butterfly are observed in the work area, work activities will temporarily cease unless the USFWS-Approved Biologist determines that impacts have been avoided or minimized to the greatest extent practicable.

If work is stopped and the USFWS-Approved Biologist needs additional guidance, USFWS will be contacted as soon as is reasonably possible.

Butterfly-7, *Restoration of Disturbed Areas.* Restoration of temporary impacts to Smith's blue butterfly habitat will occur in accordance with a restoration plan that is reviewed and approved by the appropriate USFWS Office prior to implementation of the Proposed Restoration Project. All temporary impacts will be restored with an assemblage of native species consistent with the habitat affected and will include host plants found in the vicinity of the project area.

2.1.5.3.7. Fish

There are four federally-listed fish species being addressed in this PBO. A list of these fish species is provided in Table 11. The General Fish Protection Measures described in this section are applicable to all species identified in Table 11. In addition, Species Protection Measures are provided in this section for individual species to avoid or minimize potential adverse effects.

Table 11: Covered Species – **Fish**
Self-Imposed Annual Take Limits and Effects Determinations

Common Name	Annual Take Limits	Effects Determination – Individuals	Effects Determination – Critical Habitat
Delta smelt	No more than 1 individual injured or killed annually. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.	LAA	LAA
Lahontan cutthroat trout	No more than 20 NTUs 500 feet downstream of the project site or no more than 20% above background conditions, whichever is greater. No more than 3% of capture and relocations injured or killed.	LAA	Not Applicable
tidewater goby	No more than 10% of all individuals captured and relocated may be injured or killed per project.	LAA	LAA
unarmored threespine stickleback	No more than 2 individuals injured or killed per local population annually.	LAA	Not Applicable

Notes:

NTU = Nephelometric Turbidity Unit

Limits reset on January 1 each year. Limits apply to the entire range of the species (range-wide), unless otherwise indicated.

LAA = ESA determination of may affect, and is likely to adversely affect
NLAA = ESA determination of may affect, and is not likely to adversely affect

General Fish Protection Measures

General Fish Protection Measures listed in this section should be considered for inclusion in the project (and indicated via the ESA Section 7(a)(2) Review Form) if the project may affect any of the covered fish species listed in Table 11. In addition to these General Fish Protection Measures, several GPMs, as applicable, are important to protect these species. These GPMs include but are not limited to GPM-2, *Construction Work Windows*; GPM-4, *Environmental Awareness Training*; GPM-5, *Environmental Monitoring*; ASP-1, *Qualifications of the Qualified Biologist and USFWS-Approved Biologist*; ASP-2, *Preconstruction Surveys*; GPM-18, *Species*

Capture, Handling, and Translocation; WQHM-3, *Erosion Control Plans*; WQHM-4, *Hazardous Materials Management and Spill Response Plan*; IWW-1 through IWW-13 (In-Water Work); and VHDR-6 and VHDR-7 (for herbicide use).

FISH-*1, Habitat Disturbance Avoidance and Minimization.* Disturbance to aquatic habitat for covered fish species will be avoided and/or minimized to the maximum extent practicable, unless the purpose of the project is to provide overall benefits to the species and the benefits are greater than any temporary impacts to habitat.

FISH-2, *Habitat Assessment and Surveys*. For projects that may result in impacts to aquatic habitat within the range of covered fish species, no less than 30 days prior to construction of the project, the Project Proponent will evaluate the potential for covered fish species to be present in the project area. The evaluation may be based on existing information if sufficiently available, or the Project Proponent may conduct a habitat assessment or focused survey for those species, if appropriate. An example where it may not be appropriate to conduct a survey is when electrofishing or seining could result in mortality (e.g., mortality of tidewater goby), and it is preferred to assume species presence. The habitat assessment and/or survey will be conducted in potentially suitable aquatic habitat within 300 feet of the proposed project. The Qualified Biologist will conduct the habitat assessment and/or fish survey and will adhere to the standards provided in the CDFW *California Salmonid Stream Habitat Restoration Manual 4th Edition Volume I: Section IV* (CDFW 2010). If Covered fish species are observed during the survey or the habitat is otherwise potentially occupied, based on the results of the habitat assessment or existing information, the Project Proponent will implement *FISH-3, Fish Capture and Relocation*, as described below.

FISH-3, *Fish Capture and Relocation.* For projects that require dewatering or other work in suitable habitat for the covered fish species (as identified in FISH-2), if fish capture and relocation would be the most protective approach to managing fish during construction, then a fish capture and relocation plan will be developed and submitted to the appropriate USFWS Office for approval as part of the ESA Section 7(a)(2) Review Form submittal. The plan will describe the biologist's qualifications, capture methods, capture and relocation work areas, and reporting requirements, including details in the list below. If capture and relocation is not feasible or would not be the most protective approach to managing fish in the work area (e.g., if dewatering is not needed or appropriate; or if fish are in a large, unconfined waterbody), other methods to protect covered fish species (e.g., timing restrictions around season and tide, or bubble curtains) should be detailed in a plan and submitted to USFWS for approval. It is recommended that the capture and relocation plan be submitted with the ESA Section 7(a)(2) Review Form to avoid delays.

a. This plan will incorporate the latest USFWS and NMFS guidance relating to the capture and relocation of fish, as applicable.

b. Procedures for decontamination of any equipment used in the capture and relocation of fish will be identified.

c. Prior to the implementation of capture and relocation activities, relocation (or release) sites will be identified by the USFWS-Approved Biologist, based on proximity, access, habitat suitability, and potential to be affected by construction-related disturbance. Suitable habitat for relocation sites will be in the same watershed/subwatershed basin where fish were originally captured. One or more of the following methods will be used to capture protected fish species: electrofishing, dip net, seine, throw net, minnow trap, and hand.

d. Fish relocation will only be conducted (or led) by a USFWS-Approved Biologist. If a USFWS-Approved Biologist is needed, the Project Proponent will submit the biologist's qualifications to the appropriate USFWS Office for approval 30 days prior to project construction. The USFWS-Approved Biologist will have knowledge and experience in fish biology and ecology; fish/habitat relationships; biological monitoring; handling, collecting, and relocating fish; or other relevant experience.

e. Residual surface water associated with the diverted or dewatered habitat will be monitored or sampled for the presence of fish by a USFWS-Approved Biologist as soon as the waters are isolated. If a Covered Species of fish is observed in the isolated habitat, they will be immediately captured and relocated to the suitable habitat outside of the construction area, but in the same water basin, by the USFWS-Approved Biologist, in accordance with the approved fish capture and relocation plan.

f. The USFWS-Approved Biologist will relocate any stranded covered fish species to an appropriate place, depending on the life stage of the fish and consistent with the USFWS-Approved rescue and relocation plan.

g. The USFWS-Approved Biologist will note the number of individuals observed in the affected area, the number of individuals relocated, the approximate size of individuals, the location of capture and release, any instances of injury or mortality, and the date and time of the collection and relocation. This information will be reported to the appropriate USFWS Office within 7 days of completion of the fish capture and relocation effort.

FISH-4, *Reporting.* The USFWS-Approved Biologist will provide a written summary of work performed (including biological survey and monitoring results), BMPs implemented (e.g., use of biological monitoring, flagging of work areas, or erosion and sedimentation controls), and supporting photographs of each stage to the appropriate USFWS Office. Furthermore, the documentation describing Covered Species surveys and relocation efforts (if appropriate) will be completed in accordance with the requirements of *FISH-3, Fish Capture and Relocation*.

Tidewater Goby

TIGO-1, *Capture and Relocation.* Capture and relocation of tidewater goby will be conducted by a USFWS-Approved Biologist in accordance with the requirements of *FISH-3, Fish Capture and Relocation*. Fish rescue and relocation will be conducted as described in the USFWS-Approved fish rescue and relocation plan submitted by the Project Proponent. Gobies will be transported in separate containers from larger size class fish to avoid predation. Seining and

dipnetting are the preferred methods of capturing fish, but electrofishing may be required to capture fish in complex habitats. For projects that do not require dewatering but cannot complete in-water work in one day, successive sets of block nets may be required each day, and subsequent surveys and capture/relocation may be performed accordingly. Once the block nets are secured, a USFWS-Approved Biologist will remove all tidewater gobies found between them, using a 1/8--inch seine and dip nets. The USFWS-Approved Biologist will then relocate tidewater gobies to suitable habitat downstream of the project area. Fish released from one day's work will not be released into areas projected to be excavated on successive days. Not to exceed the self-imposed take limit of no more than 10% of the individuals captured and relocated at any individual project site may be injured or killed. If this self-imposed take limit is reached, the Project Proponent will stop work in tidewater goby habitat and contact the USFWS Field Office.

Unarmored Threespine Stickleback

Currently, the unarmored threespine stickleback is restricted to three areas: the upper Santa Clara River and its tributaries in Los Angeles County; San Antonio Creek on Vandenberg Air Force Base in Santa Barbara County; and the Shay Creek vicinity (which includes Shay Pond, Sugarloaf Pond, Juniper Springs, Motorcycle Pond, Shay Creek, Wiebe Pond, and Baldwin Lake) in San Bernardino County (Moyle 2002). San Felipe Creek in San Diego County is another area that may support the unarmored threespine stickleback; however, its current status is unknown. Therefore, all projects in or immediately adjacent to these four locations will implement the subsequent protection measures to avoid or minimize the potential for effects to these species.

UTS-1, *Habitat Disturbance*. Projects requiring disturbance in known or potentially occupied suitable habitat for the unarmored threespine stickleback will require the following information to be included with the ESA Section 7(a)(2) Review Form for USFWS review and approval: detailed project design information; and an explanation of how impacts to unarmored threespine stickleback and its critical habitat will be minimized. This information will allow the Project Proponent and USFWS to determine if any additional conservation measures are necessary.

Not to exceed the self-imposed take limit of no more than two individuals injured or killed per local population annually.

Delta Smelt

Delta smelt occurs in the Sacramento-San Joaquin Delta (Delta). Therefore, all projects in the Delta will implement the following protection measure to avoid or minimize the potential for effects to this species.

DS-1, *Work Windows.* In-water work occurring in waters potentially supporting Delta smelt will occur between August 1 and November 30.[20]

Not to exceed the self-imposed take limit of no more than one individual injured or killed annually. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area. The self-imposed take limit also requires no net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.

Lahontan Cutthroat Trout

LCT-1, *Work Windows.* In-water work occurring in waters potentially supporting Lahontan cutthroat trout rearing and migration, but not spawning, will occur between July 1 and March 31. In-water work occurring in waters potentially supporting Lahontan cutthroat trout spawning will occur between October 1 and March 31. If preconstruction monitoring during the spawning season demonstrates that juveniles have emerged from the gravel and are mobile and able to avoid disturbance prior to October 1, and with written approval from the USFWS Field Office (e.g., email), in-water work may begin in spawning habitat prior to October 1. Not to exceed the self-imposed take limit of no more than 20 NTUs 500 feet downstream of the project site or 20% above background conditions (whichever is greater) and not to exceed 3% of capture and relocations injured or killed.

2.1.5.3.8. Plant Species: Vernal Pool and Non-Vernal Pool Species

There are 29 federally-listed plant species being addressed in this PBO. Table 12 provides a list of the vernal pool and other plant species. The General Plant Species Protection Measures described in this section are applicable to all species provided in Table 12.

Table 12: Covered Species – **Plants**

	ESA Effects Determinations	
Common Name	**Individuals**	**Critical Habitat**
Butte County meadowfoam	LAA	LAA
California Orcutt grass	LAA	Not Applicable
Contra Costa goldfields	LAA	LAA

[20] Extended or alternative work windows may be considered on an individual project basis with prior approval from USFWS ES, provided the Project Proponent can demonstrate that measures implemented to avoid or minimize exposure would do so at a level commensurate with the standard work windows.

Common Name	ESA Effects Determinations	
	Individuals	Critical Habitat
few-flowered navarretia	LAA	Not Applicable
fleshy owl's-clover	LAA	LAA
hairy Orcutt grass	LAA	LAA
Hoover's spurge	LAA	LAA
Otay Mesa-mint	LAA	Not Applicable
Sacramento Orcutt grass	LAA	LAA
San Diego ambrosia	LAA	LAA
San Diego button-celery	LAA	Not Applicable
San Joaquin (San Joaquin Valley) Orcutt grass	LAA	LAA
slender Orcutt grass	LAA	LAA
spreading navarretia	LAA	LAA
thread-leaved brodiaea	LAA	LAA
Ben Lomond spineflower	LAA	Not Applicable
California seablite	LAA	Not Applicable
Howell's spineflower	NLAA	Not Applicable
La Graciosa thistle	LAA	LAA
marsh sandwort	LAA	Not Applicable
palmate-bracted bird's-beak	NLAA	Not Applicable
pedate checker-mallow	NLAA	Not Applicable
salt marsh bird's beak	LAA	Not Applicable
Santa Ana River woolly-star	NLAA	Not Applicable
slender-horned spineflower	NLAA	Not Applicable
soft bird's-beak	NLAA	NLAA
Sonoma alopecurus	NLAA	Not Applicable
Suisun thistle	NLAA	NLAA
Ventura marsh milk-vetch	LAA	LAA

LAA = ESA determination of may affect, and is likely to adversely affect
NLAA = ESA determination of may affect, and is not likely to adversely affect

General Plant Protection Measures

General Plant Protection Measures in this section should be considered for inclusion in the project (and indicated via the ESA Section 7(a)(2) Review Form) if any of the covered plant species listed in Table 12 may be affected by the proposed project. In addition to these General Plant Protection Measures, several GPMs, as applicable, are important to protect these species. These GPMs include but are not limited to GPM-4, *Environmental Awareness Training*; GPM-5, *Environmental Monitoring*; GPM-7, *Environmentally Sensitive Area and/or Wildlife Exclusion Fencing*; GPM-8, *Prevent Spread of Invasive Species*; GPM-9, *Practices to Prevent Pathogen Contamination*; GPM-12, *Fugitive Dust Reduction*; ASP-1, *Qualifications of the Qualified Biologist and USFWS-Approved Biologist*; ASP-2, *Preconstruction Surveys*; WQHM-3, *Erosion Control Plans*; WQHM-4, *Hazardous Materials Management and Spill Response Plan*; VHDR-1 through VHDR-5 (*Vegetation/Habitat Disturbance and Revegetation*), and VHDR-6 through VHDR-8 (for herbicide use).

General Plant Protection Measures *PLANT1* through *PLANT6* are focused on avoiding impacts to Covered plant species. PLANT7 includes measures for when effects cannot be avoided. Plant Protection Measures 1 through 7 apply to all projects but impacts up to 10% of some pools may be authorized because of the self-imposed take limit for Conservancy fairy shrimp, Longhorn fairy shrimp, Riverside fairy shrimp, San Diego fairy shrimp, Vernal pool fairy shrimp, and Vernal pool tadpole shrimp. As a result, vernal pool plant species that occur in such pools may be adversely affected by project activities. In addition, because PLANT-8 allows this 10% limit to be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS Field Office, via the ESA Section 7(a)(2) Review Form process, some of the plant protection measures below may not be applicable. In such cases, the USFWS Field Office will work the Project Proponent to identify project specific vernal pool plant species protection measures in order to minimize impacts during the restoration project.

PLANT-1, *Habitat Assessment and Surveys.* If the project area can potentially support Covered plant species, a Qualified Biologist will conduct a survey for Covered plant species within 1 year prior to commencement of ground-disturbing activities, to capture the bloom period(s) of all covered plant species with potential to occur. The USFWS-approved species-specific habitat assessment and survey protocols at the time when this document was written are listed below in the Species-Specific Measures. Existing methodologies may change and new methodologies may be developed. Project proponents should coordinate with the respective USFWS Field Office about protocols when developing a project description/completing the ESA Section 7(a)(2) Review Form. Surveys should follow USFWS's *General Rare Plant Survey Guidelines* (Cypher 2002); and CDFW's *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities* (CDFW 2018), or their most recent equivalents. Additional guidelines are provided for Burke's goldfields, a plant of the Santa Rosa

Plain (USFWS 1996a). If surveys are not possible, then covered plants will be assumed to be present in all suitable habitats in the project area.

- **Timing**: The survey(s) must be conducted when all potentially occurring covered plants are identifiable, usually in the flowering, peak flowering, or fruiting stage. Blooming time periods are provided in Table 13.
- **Reference Populations:** Known nearby reference populations should be visited to confirm annual blooming period and identification at the same time as the survey(s).
- **Method:** Surveys will be conducted in a manner that avoids direct impact (e.g., crushing) of Covered or other sensitive plants.
- **Flagging:** All identified Covered Species will be flagged prior to senescence. Flagging or other field markers identifying the plants—or, in the event that 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.
- **Reporting:** The Project Proponent will submit a report to the USFWS in advance of any ground-disturbing activities. The report will provide the results of all surveys, a summary of all the data collected, and the habitat assessment. Information regarding the location of Covered plant populations will be provided to CDFW's CNDDB according to their reporting protocols.

Table 13: Covered Plant Species Blooming Periods

Common Name	Blooming Period
Ben Lomond spineflower	April to June
Butte County meadowfoam	March to May
California Orcutt grass	April to August
California seablite	July to October
Contra Costa goldfields	March to June
few-flowered navarretia	May to June
fleshy owl's-clover	April to May
hairy Orcutt grass	May to September
Hoover's spurge	July to October
Howell's spineflower	May to July
La Graciosa thistle	May to August
marsh sandwort	May to August
Otay Mesa-mint	May to July
palmate-bracted bird's-beak	May to October
pedate checker-mallow	May to August
Sacramento Orcutt grass	April to September
salt marsh bird's-beak	May to November
San Diego ambrosia	April to October

San Diego button-celery	April to June
San Joaquin (=San Joaquin Valley) Orcutt grass	April to September
Santa Ana River woolly-star	April to September
slender Orcutt grass	May to October
slender-horned spineflower	April to June
soft bird's-beak	June to November
Sonoma alopecurus	May to July
spreading navarretia	April to June
Suisun thistle	July to September
thread-leaved brodiaea	March to June
Ventura marsh milk-vetch	June to October

PLANT-2*, Exclusion Buffer Establishment.* A minimum 50-foot avoidance buffer around all Covered plants or their suitable habitat to be avoided will be clearly delineated with flagging or field markers. A larger exclusion buffer may be established if determined by the Qualified Biologist to be necessary for the protection of the Covered plants. No work activity will occur within the exclusion buffer, except as permitted under Measure *PLANT4, Work Restrictions in the Exclusion Buffer*. Additionally, a buffer of at least 300 feet from any vernal pool, vernal pool grassland, or seasonal wetland, known Covered plants occurrence, or designated critical habitats 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

b. mixing of pesticides, herbicides, or other potentially toxic chemicals

Routine maintenance activities within 250 feet of vernal pool and swale habitat will be avoided, to the maximum extent possible.

PLANT-3*, Exceptions to Work Restrictions in the Exclusion Buffer.* If a USFWS-Approved Biologist determines that some work activities can take place within the exclusion buffer described in Measure PLANT-3 without causing any adverse direct or indirect impacts to Covered plants identified for avoidance, those approved work activities may be conducted within the exclusion buffer. Covered vernal pool plants will be clearly marked by a USFWS-Approved Biologist prior to worker entry into the exclusion buffer. Workers may only enter the exclusion buffer when accompanied by a Qualified Biologist, and all work within the exclusion buffer will be monitored by a Qualified Biologist. Based on the results of the botanical surveys, complete avoidance of populations onsite during their respective blooming periods will be applied for the following four Covered plant species with limited populations: Ben Lomond spineflower, soft bird's-beak, Suisun thistle, and Howell's spineflower.

PLANT-4*, Additional Seasonal Avoidance of Vernal Pool Plant Species and Other Covered Annual and Perennial Species Beyond the Exclusion Buffer.*

a. ***For Vernal Pool Plant Species****:* Work within 250 feet of suitable Covered 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. If any construction activities remain and must occur during the October 16 to May 31 wet period, exclusion fencing and erosion control materials will be placed around the vernal pools and other seasonal wetlands, as determined by the Qualified 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 Qualified Biologist will oversee, monitor, inspect, and maintain the exclusion fencing.

b. ***For Other Covered Annual Species****:* To avoid impacts to other Covered annual plant species, work will be timed to occur after plants have set seed and senesced, avoid soil disturbance, and avoid actions that have the potential to reduce habitat quality. This measure is not applicable to Menzies' wallflower (a monocarpic perennial), which can live many years as a small rosette before flowering. Optimal work windows are August 1 through October 31 for Howell's spineflower. Known occupied habitat, as it is displayed in CNDDB for Howell's spineflower, will be avoided. If a project would occur in known occupied habitat of Howell's spineflower species, then the Project Proponent should consult with the appropriate USFWS Field Office individually for a potential "Likely to Adversely Affect" LAA determination.

PLANT-5*, Biological Monitoring.* A Qualified Biologist will monitor all construction activities, as described in GPM-5, *Environmental Monitoring*, and also within the buffers established under *PLANT-3, Exclusion Buffer Establishment*. Any non-disturbance exclusion zones will be established, maintained, and monitored. The Qualified Biologist will ensure that loss of Covered plants or destruction of their habitat does not occur outside of the project footprint.

PLANT-6*, Herbicide Application, Clearing, and Ground Disturbance Near Covered Plants.* If mechanical removal is not effective, or could damage sensitive habitats, limited herbicide application may occur as noted below and in accordance with GPMs VHDR-6 through VHDR-8. See also *VPBR-8, Herbicide Application, Clearing, and Ground Disturbance Near Vernal Pools,* for measures to protect vernal pool plants.

a. **Work Near Other Covered Plant Species (Nonvernal Pool Species)**: To avoid impacts to other Covered Species (non-vernal pool species), the following protections will be applied:

   i. Application of herbicide will occur during dry conditions, to the maximum extent practicable.

   ii. Backpack and hand-held herbicide application, if applied in dry conditions, is prohibited within 5 feet of any Covered plant. Protect Covered plants from herbicide drift (e.g., cover with plastic when spraying, or use a wick applicator).

   iii. Broadcast and power spray herbicide application is prohibited.

iv. Ground-disturbing activities are prohibited within 5 feet of senesced annual and perennial plants, and within 10 feet of perennial plants. Ground disturbance should occur outside of the dripline of any woody species identified for avoidance.

PLANT-7*, Measures for When Effects Cannot Be Avoided.* If Covered plants cannot be avoided through the measures PLANT-1 through PLANT-6, the following measures will apply:

a. For species and critical habitat with an NLAA determination (Table 13), measures PLANT-1 through PLANT-6 (or alternate measures proposed by the Project Proponent) must be used to avoid adverse effects. If adverse effects cannot be avoided, separate consultation with the USFWS is necessary.

b. For species with an LAA determination (Table 13), limited, temporary adverse effects are allowed, consistent with the following measures. A site-specific restoration plan will be developed and implemented. This plan will be provided with the ESA Section 7(a)(2) Review Form for review and approval by the USFWS Field Office. The plan will demonstrate no net loss of habitat where presence is confirmed or assumed, number of individuals, genetic diversity, or habitat quality of the Covered Species occurrence. The restoration plan will include, at a minimum:

   i. No permanent loss of habitat will occur.

   ii. Destruction of federally-listed plant individuals will be avoided to the extent feasible. In addition, this destruction will be restricted to 1% of the affected population, excluding impacts to the seedbank.

   iii. Project proponents will summarize observations of and impacts to federally-listed plants during restoration activities and include them in the Post-Construction Report Form and any observed destruction of federally-listed plant species exceeding 1% of a population will be reported to the appropriate USFWS office within 72 hours.

c. Projects that would have permanent effects (e.g., permanent removal of vernal pool habitat) on Covered plant species will require separate, project-specific consultation.

PLANT-8*, Vernal Pool Plant Species Measures for Temporary Vernal Pool Habitat Impacts.* For temporary impacts to vernal pools with covered vernal pool plant species, the following measures will apply:

a. Minimize adverse effects to covered vernal pool plant species to the maximum extent practicable, not to exceed the self-imposed take limit of 10% per pool occupied by respective covered shrimp species. This can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS FO, via the ESA Section 7(a)(2) Review Form Process.

b. If adverse effects to covered vernal pool plant species are unavoidable, topsoil/inoculum will be collected, stored appropriately, and returned to the disturbed area of the vernal pool as soon as possible, once disturbance activities cease.

c. For those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS Field Office, via the ESA Section 7(a)(2) Review Form process, the USFWS Field Office will work the Project Proponent to come up with additional minimization measures as needed.

3. ENDANGERED SPECIES ACT BIOLOGICAL and CONFERENCE OPINIONS

3.1. Analytical Framework for the Jeopardy and Adverse Modification Determinations

The main purpose of this PBO is to examine whether the proposed action will jeopardize the continued existence of threatened or endangered species as described in Section 7(a)(2) of the ESA or result in the adverse modification or destruction of designated critical habitat.

3.1.1. Jeopardy Determination

In accordance with 50 CFR § 402.14(g)(2) and (3), the jeopardy determination in this PBO relies on the following four components:

1. The *Status of the Species* evaluates the species' current range-wide condition relative to its reproduction, numbers, and distribution; the factors responsible for that condition; the species survival and recovery needs; and explains if the species' current range-wide population is likely to persist and if recovery of the species will remain viable.
2. 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. It evaluates the current condition of the species in the action area relative to its reproduction, numbers, and distribution absent the consequences of the proposed action; 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* refers to 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 (as described above). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. 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. In this PBO we include an evaluation of all future consequences to the species that are reasonably certain to be caused by the proposed action, including the consequences of other activities that are caused by the proposed action, in the action area;

and how those impacts are likely to influence the survival and recovery of the species.

4. *Cumulative Effects* evaluates the consequences of future, non-Federal activities reasonably certain to occur in the action area on the species, and how those impacts are likely to influence the survival and recovery the species.

In accordance with policy and regulation, the jeopardy and destruction or adverse modification determination is made by evaluating the Effects of the Action with the Cumulative Effects with consideration of the Environmental Baseline and Status of the Species. This formulates our opinion as to whether the proposed action reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution of that species.

The jeopardy analysis in this PBO places an emphasis on consideration of the range-wide survival and recovery needs of listed species and the role of the action area in the survival and recovery of the listed species as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

3.1.2. Adverse Modification Determination

This PBO does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this PBO relies on four components: 1) the *Status of Critical Habitat*, which evaluates the range-wide condition of designated critical habitat for listed species in terms of physical and biological features (PBFs), the factors responsible for that condition, and the intended recovery function of the critical habitat overall; 2) the *Environmental Baseline*, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; 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 PBFs and how that will influence the recovery role of affected critical habitat units; and 4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the PBFs and how that will influence the recovery role of affected critical habitat units.

For purposes of the adverse modification determination, the effects of the proposed Federal action on critical habitat are evaluated in the context of the range-wide condition of the critical habitat, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PBFs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the listed species.

The analysis in this PBO places an emphasis on using the intended range-wide recovery function of critical habitat and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination. The analysis is generally organized in the following manner.

- *Identify the range-wide status of the species and critical habitat likely to be adversely affected by the proposed action.* This section describes the current status of each listed species and its critical habitat relative to the conditions needed for recovery. We determine the range-wide status of critical habitat by examining the condition of its physical or biological features (PBFs or PCEs) – which were identified when the critical habitat was designated.
- *Describe the environmental baseline in the action area.* This section 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. It evaluates the current condition of the species in the action area relative to its reproduction, numbers, and distribution absent the consequences of the proposed action; the factors responsible for that condition; and the relationship of the action area to the survival and recovery of the species.
- *Analyze the effects of the proposed action on both species and their habitat.* In this step, we consider how the proposed action would affect the species' reproduction, numbers, and distribution. "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.
- *Describe any cumulative effects in the action area.* Cumulative effects, as defined in our implementing regulations (50 CFR 402.02), are the effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area. Future Federal actions that are unrelated to the proposed action are not considered because they require separate section 7 consultation.
- *Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.* In this step, we add the effects of the action to the environmental baseline and the cumulative effects to assess whether the action could reasonably be expected to: 1) reduce appreciably the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or 2) reduce the conservation value of designated or proposed critical habitat. These assessments are made in full consideration of the status of the species and critical habitat.
- *Reach jeopardy and adverse modification conclusions.* In this step, we state our conclusions regarding jeopardy and the destruction or adverse modification of critical habitat. These conclusions flow from the logic and rationale presented in Integration and Synthesis.
- *If necessary, define a reasonable and prudent alternative to the proposed action.* If, in completing the last step in the analysis, we determine that the action under consultation is likely to jeopardize the continued existence of listed species or destroy or adversely modify

designated critical habitat, we must identify a reasonable and prudent alternative to the action. The reasonable and prudent alternative must not be likely to jeopardize the continued existence of listed species nor adversely modify their designated critical habitat and it must meet other regulatory requirements.

3.2. Organization of this Programmatic Biological and Conference Opinion

This is a large programmatic opinion covering multiple species and actions across the entire state of California where the Action Agencies are considering the effects of a broad suite of restoration activities on the species and critical habitat identified in Table 1. However, at this time, we do not know the specific types, timing, or locations of activities that the Action Agencies, or its applicants, may propose within the State of California or the specific number of listed (and proposed) species or amount of habitat (including critical habitat) that each activity may affect.

This is different than for most consultations where the USFWS and Action Agency are aware of detailed information regarding the proposed action. For example, we know the project's specific location and its precise type; we often have a general idea of the timing of development. Because of knowing the specific location of the action, we can frequently estimate the numbers of individuals of a given species that the proposed action may affect.

Given the uncertainties associated with this consultation, the Action Agencies established specific sideboards, processes, and a 10-year time limit on the effort. The sideboards/limits to the adverse effects for each of the species and critical habitat, identified in Table 4, during activities as a threshold for the re-initiation of formal consultation. Because the Action Agencies adopted disturbance caps with regard to habitat in areas that are important for the conservation of these species, we did not establish acreage thresholds with regard to habitat. We will evaluate the general effects of activities on the species and their respective critical habitat, if designated, assess how the conservation and management actions are likely to mitigate these effects, and determine if the residual effects are likely to jeopardize the continued existence of the species or destroy or adversely modify any designated critical habitat. The process established by the Action Agencies, the ESA Section 7(a)(2) Review Form process, will provide the detailed information for USFWS review and approval in order to be appended to this PBO.

Since this biological and conference opinion addresses 61 species and 36 critical habitats, we will organize the biological and conference opinion analyses by taxonomic class. In Appendix C, we provide information on the range-wide status of each of the Covered Species in that class and any associated critical habitat and its environmental baseline within the action area. Please note, the range-wide status will be the same as the action area status for those species that only occur in California. We will conduct our analysis of the effects of the action on the class of species first, since many of the effects are similar. We will then provide more specific information unique to each of the species and any associated critical habitat. We will provide our conclusions with regard to whether the proposed action is likely to jeopardize the continued existence of the

species or result in the destruction or adverse modification of critical habitat. If appropriate, an incidental take statement will follow the conclusion. This format will be repeated for each species organized by the six taxonomic classes.

Biological analyses are frequently not readily quantifiable. For example, we usually cannot state that the degradation of a certain local area as the result of an activity will result in the likelihood that species is 25% less likely to survive and recover. Therefore, we address the likely magnitude of the effects of activities considered in this biological and conference opinion by using the terms "considerable," "appreciable," and "negligible." In the final rule regarding the definition of destruction or adverse modification of critical habitat (81 Federal Register 7214), the USFWS defined ''considerably'' to mean "worthy of consideration'' and described it as a way of "stating that we can recognize or grasp the quality, significance, magnitude, or worth of the reduction in the value of critical habitat." In that rule, we defined the term ''appreciably diminish'' to mean "that the relevant question is whether the reduction has some relevance because we can recognize or grasp its quality, significance, magnitude, or worth in a way that negatively affects the value of the critical habitat as a whole for the conservation of a listed species." Although both of the definitions refer to critical habitat, we can use these adjectives to qualify the scale of any impact. To continue further down this scale, we will use the term "negligible" to indicate when activities would result in effects that are too small to meaningfully measure, detect, or evaluate. Through use of these qualifying adjectives, we will describe the relative effect of various activities on each species and any associated critical habitat.

3.3. Status of the Species/Critical Habitat and Environmental Baseline

The Status of the Species describes the current range-wide condition of the species, the factors responsible for that condition, and its survival and recovery needs. The Environmental Baseline 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.

For those Covered Species with Critical Habitat designated, the Status of the Species and Baseline for Critical Habitat is included. The Status of Critical Habitat describes the range-wide condition of the critical habitat for the species. The Environmental Baseline of the critical habitat in the action area describes the factors responsible for that condition, and the recovery role of the critical habitat in the action area. Please note that the phrases "primary constituent elements" (PCEs) and "physical and biological features" (PBFs) are synonymous. Critical habitat rules published before February 11, 2016, used the term PCE, while critical habitat rules published after that date use the term PBF.

All of the above information was combined into a single document for each of the Covered Species and any associated Critical Habitat. Please note that many of the Covered Species only occur within the State of California and for such species, the Environmental Baseline and Status is one and the same.

Due to the volume of species addressed in this PBO, the Status and Environmental Baseline for each Covered Species and any associated Critical Habitat is provided in Appendix C.

3.4. Effects Analysis

The effects analysis evaluates 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. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. 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 (see 50 CFR § 402.17). In this PBO we include an evaluation of all future consequences to the species that are reasonably certain to be caused by the proposed action, including the consequences of other activities that are caused by the proposed action, in the action area; and how those impacts are likely to influence the survival and recovery of the species. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. The effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action.

Effects to listed species can be discountable, insignificant, wholly beneficial, or adverse. To make this determination, an assessment of the individual's expected exposure to a stressor is made, along with the species expected response, based on its biology. Effect determinations for individuals, or their habitat, are based on survey data, assumptions regarding occupancy by various life stages (based on their life history), the best available scientific data, or direct experience with and observations of similar activities and observed effects.

An effect is considered insignificant if it cannot be meaningfully measured, detected, or evaluated. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not be able to meaningfully measure, detect, or evaluate insignificant effects or expect discountable effects to occur (USFWS and NMFS 1998). Beneficial effects are contemporaneous positive effects without any adverse effects to the species (USFWS and NMFS 1998). An effect is adverse when the effect cannot be clearly demonstrated as insignificant, discountable, or wholly beneficial.

This effects analysis relies on information presented in Appendix C, Sta*tus of the Species/Environmental Baseline*, of this PBO for each of the species identified in Table 1, information in the PBA, our files, and conversations and personal communications with USFWS biologists.

The restoration actions covered by this PBO have predictable effects regardless of where in the action area they are carried out. The USFWS has conducted individual and programmatic consultations on restoration activities similar to those in the proposed action throughout the action area over the past several years, and the information gained from monitoring and feedback has been used by the Action Agencies to refine the protection measures for this consultation. We

are able to address any habitat improvement activities that are less predictable during the ESA Section 7(a)(2) Review Form Process, prior to approval.

As restoration activities often have similar effects to plants and animals, including federally-listed species, we first provide a general description of the effects of restoration activities. We then provide a more detailed description of effects per species class: Amphibians, Reptiles, Birds, Mammals, Invertebrates, Fish, and Plants (vernal pool and non-vernal pool plants). Species-specific information is provided where applicable.

3.4.1. General Effects

The potential for the Proposed Restoration Effort to have beneficial or adverse effects to Covered Species and their critical habitats depends on a variety of factors, including the conditions present at the site, the probability of species occurrence, the timing of the activity, the types of activities implemented, and the quality and quantity of habitat in the project footprint and its vicinity. This section summarizes the effects to Covered Species and designated critical habitat from implementation of the Proposed Restoration Effort. Applicable protection measures provided in Section 2.1.5, *Protection Measures* and included as an attachment to the ESA Section 7(a)(2) Review Form, are expected to minimize adverse effects to Covered Species and designated critical habitat. In some instances, the measures can minimize the adverse effects to an insignificant or discountable level.

Descriptions of the most common and substantive effects anticipated to occur from a given project type are provided in this section. The exact location of restoration project sites, project design details, timing of the projects, and other project implementation details are unknown at this time. For this reason, the effects are described in the main effect categories that are typically encountered during implementation of restoration projects.

3.4.1.1. Beneficial Effects

Implementation of the Proposed Restoration Effort will result in a net benefit to the ecosystem through the establishment, restoration, and enhancement of aquatic and riparian habitats. These beneficial effects can result in improved conditions that support life history requirements for foraging, breeding, and rearing, and ultimately provide benefits to Covered Species and assist in species recovery. The degree and extent of the beneficial effects depends on the type and intent of the activity; the size and complexity of the activity; timing; and the relative contribution to the life history requirements of Covered Species found at the project site.

3.4.1.1.1. Habitat Establishment

Habitat establishment and reestablishment results in a gain in aquatic or riparian resource area and function. Examples of activities that could result in habitat establishment include removal of legacy structures; breaching of levees; constructing new wetlands, stream channels, or vernal pools; establishing living shorelines; and creating off-channel habitat features. These new aquatic habitats could include the following:

- Estuarine
- Riverine
- Lacustrine
- Seasonal wetlands (including vernal pools)
- Riparian
- Floodplains
- Upland transition zones

These habitats have the potential to support some or all life stages of Covered Species, including providing foraging, sheltering, and breeding habitat. Because proposed restoration projects would result in a net gain of new habitat where none previously occurred, they could support population colonization and expansion of Covered Species.

3.4.1.1.2. Habitat Improvement

Habitat improvement includes restoration and enhancement of ecosystems to improve function of an existing aquatic resource. All Proposed Restoration Projects are expected to result in habitat improvement. Examples include removing nonnative invasive plants and wildlife; increasing cover, diversity, or structural complexity of native plant communities; reducing soil erosion through bioengineered bank stabilization; making habitat connectivity enhancements; making in-stream habitat enhancements like gravel augmentation and placement of in-stream structures; and improving hydrologic or soil conditions.

Removal of Invasive Species

Invasive plants can alter habitat structure, increase fire frequency and intensity, exclude native plants, and decrease water availability for plants. Without control, invasive plants may spread and cause adverse impacts to the habitats and associated plants and wildlife around the project. Removal of invasive plants releases native species from competitive pressures (e.g., water, nutrients, and space availability) and aids in the reestablishment of native species. In some cases, invasive plant removal may raise groundwater tables, leading to the establishment or reestablishment of hydrologic regimes that support certain species. Treatment of invasive plants results in a long-term beneficial effect to native vegetation, including species composition and species diversity, and Covered Species that depend on native vegetation for forage and refuge.

Similarly, nonnative wildlife species can severely impact both covered wildlife and plants through predation or competition. By altering habitat, the proposed restoration projects may remove habitat that benefits nonnative wildlife species and replace it with habitat that benefits native and Covered Species. For example, small dam removal projects can result in the elimination of permanent reservoirs that support bullfrog breeding, and the replacement of these reservoirs with more natural stream conditions that support native fish and amphibians. Restoration projects may also include nonnative wildlife (e.g., crayfish or bullfrog) removal as part of project activities.

Native Revegetation

Most of the project types include revegetation as a component of the project activities. Native plants provide shelter, forage, cover for dispersal, and/or nesting material. Revegetation with native plants can support habitat elements used by Covered Species. In some situations, the goal of the revegetation project may be specifically to increase the population of a Covered plant species. Native plants also contribute to larger ecosystem benefits, including carbon sequestration. The details of the revegetation activities will depend on the project site, project design, and the Project Proponent; but the general specifications of the revegetation activities with native plants are provided in Section 2.1.5.2.1, *General Protection Measures* specifically GPM-15, *Revegetate Disturbed Areas*, which includes the preparation of a revegetation plan for the Proposed Restoration Project. Typically, revegetation efforts result in beneficial effects to Covered Species, because, among other benefits, they reduce the amount of bare ground after project construction, increase the ground cover with native plants, support the establishment and growth of vegetation communities suitable for wildlife species, reduce the establishment of nonnative plants, and prevent soil erosion. For example, riparian birds would benefit from having prompt access to riparian habitat that provides foraging, nesting, and sheltering from predators, which would result from the planting of riparian vegetation at a project site after construction activities have been completed. Another example would be the benefits of planting elderberry shrubs, the host plant for the Valley elderberry longhorn beetle, to allow for colonization or recolonization of the project site after construction.

In-Stream Habitat Improvements

Projects that restore or enhance streams, including stream bed and banks, can benefit native species through improvements in water quality, spawning habitat, dispersal habitat (including barrier removal), shelter, and foraging opportunities. Bank stabilization projects authorized under this effort would decrease sediment loading and bank failure, thereby decreasing the risk of exposure of individuals to increased turbidity, decreased water quality, or unsuitable habitat conditions. Sediment loading can affect respiratory processes in fish, increase water temperatures, cover spawning gravel in silt, reduce light penetration, impact submergent vegetation growth, and affect macroinvertebrate populations and food chains. Projects that reduce sediment loading or stabilize stream banks may reduce these effects and prevent excess sediment deposition in pools. In-stream habitat improvements may improve channel stability, increase channel complexity, and increase habitat value for fish and other aquatic organisms. Additionally, projects that reduce scour can improve habitat conditions for fish and reduce mortality associated with reduced water quality and stranding. Stabilized banks also better support the growth of riparian vegetation, which can shade streams, decrease water temperatures, and act as filters for sediment or other contaminants entering the stream corridor from adjacent uplands.

Other instream habitat improvements include placement of materials (e.g., large woody debris, riparian plantings, and rocks of many sizes [gravels and boulders]) to enhance or create habitat elements such as instream cover, refugia, basking sites, breeding or spawning habitat, or other

specific habitats that benefit native species, including fish, turtles, and frogs. Spawning gravel installed as part of stream restoration projects improves breeding success of Covered fish species; large woody debris placement can provide refuge and protection for juvenile fish from predation, as well as basking habitat for frogs and turtles. These and other types of habitat improvements that increase the complexity of the habitat generally also benefit the invertebrate communities that form the prey base for many vertebrate species, thereby increasing the suitability of aquatic habitat for many native and Covered Species. Increased habitat complexity better supports varied life history stages and provides a diversity of habitats and primary and secondary producers for food chains.

Habitat Connectivity Improvements

Habitat connectivity is important for providing species with access to an increased habitat area. Larger habitat blocks can support a wider diversity of constituent elements. Larger and linked habitat areas may support larger populations, which can be more resilient because of greater genetic diversity. These areas are also more resilient because species have alternative areas to expand into if habitat is degraded as a result of climate change or more localized impacts.

Increases in habitat connectivity can occur through the removal of barriers, both in aquatic features such as streams, and in floodplains and transition areas. Projects involving removal of small dams; removal of tide gates and legacy structures; and improvements to fish passages are expected to greatly benefit habitat connectivity for aquatic species. Projects may result in the removal of a total or partial barrier, which would open previously inaccessible areas of habitat for foraging, breeding, and dispersal. Improvement of aquatic habitat connectivity, such as the removal of nonnatural legacy instream structures, can also improve connectivity for terrestrial species that move along stream edges or through the riparian corridor. Projects that improve movement of aquatic species and the nutrients they carry benefit terrestrial ecosystems because predators and scavengers carry nutrients derived from the aquatic environment into the terrestrial environment. For amphibians, birds, and mammals, projects that increase the width and structural diversity or that eliminate gaps or barriers between corridor segments are highly beneficial. These types of projects can reduce the overall risk of mortality from predation, as well as indirect impacts to species posed by edge effects as wildlife move in the corridor. Projects that remove nonnative, invasive plants can also reduce impediments to migrating species, particularly small terrestrial species that have difficulty transiting dense vegetation.

Plant species may also benefit from barrier removal projects because new spaces may be opened up for colonization. Overall, in both terrestrial and aquatic environments, projects that improve habitat connectivity would increase gene flow among isolated individuals and populations, thereby improving their genetic health. Projects that improve habitat connectivity would also increase the potential for small populations to be reestablished following local extirpations, which would increase the persistence of species across the landscape.

Erosion Control and Other Activities to Improve Water Quality

In addition to the benefits of bank stabilization, revegetation outside of channel banks can be used to stabilize soil and reduce water quality impacts of turbidity. Furthermore, projects that remove nonnative vegetation and create conditions for sustained invasive plant control can reduce long-term herbicide use, leading to improvements in water quality.

Some projects may result in the removal of impervious surfaces. Impervious surfaces concentrate runoff and can lead to increased erosion. Projects that slow water flow, such as increasing channel sinuosity, widening floodplains, or altering wetlands to have increased water storage, may benefit groundwater recharge, reduce scour, and increase the longevity of hydrophytic vegetation.

3.4.1.1.3. Species Population Benefits

Habitat establishment and improvements have both direct and indirect beneficial effects on species populations, including population abundance and resiliency. Many of these benefits are discussed above. Higher quality, quantity, and diversity of habitats provide species populations with the opportunity to adapt when threats occur, such as climate change or a disease outbreak. Some of the additional benefits that could be realized by the Proposed Restoration Effort include:

- Reduction in the risk of catastrophic wildfire through selective vegetation clearing or thinning
- Reduction in predation through removal of predatory perches or addition of refuge habitat
- Reduction in impacts from disease due to larger population size and less stressed ecosystems
- Reduction in impact of sea level rise to species by providing habitat transition areas that migrate with increasing water levels
- Creating pools and enhancing natural groundwater recharge to address low water conditions created by climate change and water use patterns

3.4.1.1.4. Climate Change

In general, Covered Species may be exposed to changes in the environment because of increasing concentrations of greenhouse gases in the atmosphere. These environmental changes may bring about physical changes in their environment, such as sea level rise; shifts in weather patterns; shifts in ocean seasons, precipitation, and snow patterns; and increasing temperatures. These physical effects can lead to adverse biological effects, such as changes in the distributions of plant and animals, new species invasions, disease outbreaks, disrupted food webs, and ultimately increased pressure on fish and wildlife populations (USFWS 2019b). Although some species may continue to thrive in the new environments, others may struggle to adapt to these environmental and biological changes. Over time, their populations may decline, and in some instances, the species may go extinct (USFWS 2009a). The Intergovernmental Panel on Climate

Change concludes that warming and sea level rise may continue for centuries even if greenhouse gas emissions are stabilized at this time (USFWS 2009a).

The Proposed Restoration Effort may improve Covered Species' ability to adapt to climate change and potentially reduce greenhouse gas emissions to the atmosphere for the following reasons:

- Projects will increase the ecological functions and values, as well as the extent, of the aquatic system (including vegetative cover and ability to retain water). Over time, this will increase the probability that plants and animals can adapt to new conditions and that previously degraded areas will be appropriately revegetated.
- Projects may indirectly result in wildfire risk reduction through invasive plant removal and may prevent the release of greenhouse gases from hazard vegetation and other combustible sources.

3.4.1.2. Adverse Effects

The adverse effects from the implementation of the Proposed Restoration Effort are described below in the following sections. Protection Measures (Section 2.1.5, *Protection Measures*) have been developed to avoid and minimize adverse effects, as provided in the following sections. These effect categories are residual effects that may occur at project sites after implementation of the applicable Protection Measures, as documented in the ESA Section 7(a)(2) Review Form and approved in writing (on the form) by the USFWS Field Office for each specific project covered under this Proposed Restoration Effort.

3.4.1.1.1. Direct Injury or Mortality

Direct injury or mortality to Covered Species could occur with any Proposed Restoration Project, if the activities occur where Covered Species are present and protection measures cannot prevent exposure to adverse effects. Injury or mortality of a Covered Species would be avoided and minimized, where possible, by implementation of the protection measures described in Section 2.1.5.2.5, *All-Species Protection Measures;* and Section 2.1.5.3, *Guild- and Species-Specific Protection Measures*. More specifically, implementation of ASP-1, *Qualifications of the Qualified Biologist and USFWS-Approved Biologist*; and ASP-2, *Preconstruction Surveys* target the protection of Covered Species from such effects. Depending on the specific project, the presence of either a Qualified Biologist or an USFWS-Approved Biologist to survey the work area prior to conducting any project activities that could result in effects to Covered Species would minimize adverse effects to species. The goal with each restoration project will be no net loss of waters of the United States and only discountable adverse effects to Covered Species and their critical habitat through implementation of protection measures and/or offsetting habitat restoration or enhancement, when feasible. In the unlikely event that a Covered Species could be injured or killed, the injury or mortality could result from actions such as accidental burial, entrapment, collision, burning, crushing, trampling, drowning, entanglement, entrainment, electrocution, predation, or smothering. Take in the form of injury or mortality would mostly

occur during project construction, and therefore would occur in the short term. Overall, the restoration projects would result in long-term benefits to Covered Species through habitat enhancement, restoration, creation, and increased ecosystem services.

3.4.1.1.2. Trampling or Crushing of Covered Species in Terrestrial Habitats

Trampling and crushing of Covered Species in terrestrial habitats is most likely to occur from the use of construction equipment and vehicles. Covered Species could be trampled or crushed if they come in contact with equipment or active construction areas (such as where streambanks are being graded) during vegetation clearing, earth moving, and other construction activities related to restoration. Wildlife are most likely to enter a construction area when activity is limited or paused, such as in the evening or morning before daily activities begin; in many cases, construction activity and noise disturb wildlife, and mobile individuals vacate the immediate area while construction is ongoing. The protection measures described in Section 2.1.5.2.5, *All-Species Protection Measures*, have been developed to avoid or reduce these effects by limiting the potential for Covered Species to be present in active construction areas (through biological monitoring, preconstruction surveys, and/or physical barriers to entrapment). In addition, guild or species-specific work windows and protection measures have been developed to avoid work during periods of increased or heightened species movement when incidental take via trampling or crushing would be more likely to occur.

Despite implementation of protection measures, Covered Species movement cannot be perfectly predicted; therefore, unavoidable trampling or crushing of Covered Species during construction activities (including movement of equipment, materials, and personnel) remains. Although unlikely, due to the protection measures in Section 2.1.5.2.5, *All-Species Protection Measures;* and Section 2.1.5.3.8, *Plant Species: Vernal Pool and Other Covered Species,* Covered Plant Species could be trampled by equipment or personnel walking through areas where plants are growing, resulting in injury or mortality. Covered Wildlife Species may occupy construction equipment or materials stockpiles and be crushed when the equipment operation resumes or when materials are moved. In addition, covered amphibians or reptiles that seek cover in underground and often cryptic burrows could be inadvertently crushed during earth moving, during equipment placement for bank stabilization and floodplain restoration activities, and during movement and replacement of temporarily stockpiled soil during various restoration projects. Salt marsh mammals and birds may be trampled or crushed during construction of tidal wetland establishment, restoration, or enhancement projects if there is low visibility due to thick vegetation.

3.4.2. Injury Due to Physical Disturbance of Aquatic Habitat

Physical disturbance of aquatic habitat may occur during restoration construction activities, particularly during the placement of materials, which will likely affect aquatic species through the displacement and disruption of normal behaviors. For example, riffle supplementation sites, habitat structure placement sites, and floodplain and side channel enhancement sites may require

the application of gravel directly to the streambed, grading of the material, placement of stream crossings at some sites, and the use of heavy equipment in water bodies. These activities increase the likely exposure and chance for adverse effects to Covered Species. Grading work to create or improve estuarine habitats or vernal pools will similarly cause temporary adverse effects to habitats used by crustaceans, amphibians, birds, and mammals.

During in-water restoration activities, including dewatering as well as activities associated with projects that cannot realistically dewater the project area, aquatic species will likely be able to detect areas of disturbance; they will typically avoid those portions of the project footprint where equipment is actively operated or where a turbidity plume occurs. Occasionally, feeding juvenile fish and other aquatic wildlife may be attracted to activity that stirs up sediment, but when they detect immediate danger, they will generally be able to quickly move away. Also, the area disturbed by gravel placement or excavation and associated turbidity at any given time is expected to generally be only a portion of the water body; therefore, aquatic species will generally have opportunities to move to other areas where they can avoid injury or death. Implementation of all-species protection measures, in particular preconstruction surveys and species capture, handling, and translocation guidelines, will reduce the risk of injury to Covered Species associated with habitat disturbance by requiring study and consideration of effects of in-water work on Covered Species in advance of project work, and by requiring that planning and execution of any species handling be performed by USFWS-Approved Biologists. In addition, species measures for Covered Species such as amphibians and fish would reduce injury due to disturbance of aquatic habitat by preventing inadvertent disease conveyance through contaminated equipment and gear; implementing appropriate species handling protocols; and performing work during periods of reduced species activity.

However, there may be some instances where retreat or escape is not immediately available. In some cases, aquatic species, especially more vulnerable juveniles, could be harmed or killed due to prolonged exposure to turbid conditions. Even though Covered Species are expected to move out of the area to adjacent suitable habitat to avoid equipment and before dewatering structures, gravel, logs, or boulders are placed over their habitat, some individuals, particularly juveniles, may attempt to find shelter in the substrate and be injured or killed by equipment or material placement.

3.4.3. Predation

As described in Section 2.1.3, *Eligible Project Types and Design Guidelines,* some restoration projects may include modification, relocation, or creation of infrastructure to facilitate habitat restoration. The creation or expansion of overwater and in-water structures (e.g., bridges, wharves, or poles) may create cover and perch sites for predatory species. Increased cover and perches for predators may increase predation on Covered Species or have effects through increased predation on prey species on which Covered Species may depend. In addition, areas that attract predators could result in movement obstacles for Covered Species of aquatic wildlife, which must expend additional energy to avoid these structures. In contrast, a lack of complex habitat structure may also increase Covered Species' exposure to predation because they disperse

across open areas, such as areas where vegetation has been removed and has not yet reestablished. Temporary changes in aquatic habitat resulting from construction-related water diversion and work area isolation can also temporarily create habitat favorable to aquatic predators (e.g., bullfrogs and some fish species) and increase mortality of Covered Species.

Implementation of GPMs for in-water staging and use of barges will minimize the number of new predator perches and increased predation on Covered Species. GPMs related to dewatering, water diversion, and cofferdam construction (see IWW6, *Dewatering/Diversion*) will reduce effects associated with increased predator presence by limiting dewatering to the minimum area required to perform work and the shortest duration of habitat disruption. These GPMs will also use techniques that discourage the development of new scour pools or turbid conditions. Despite measures to limit conditions that are attractive to existing or new predators, some short-term construction conditions required for successful completion of a restoration project may temporarily lead to increased predation on, and therefore mortality of, Covered Species.

3.4.4. Entrapment and Entanglement

Covered Species, particularly wildlife, can become entrapped in natural or artificial structures, or entangled in construction materials. Covered Species may be trapped as a result of excavation or movement of materials, including deposition of material. If a Covered Species falls into an excavated trench, it may be subsequently buried. Fish, invertebrates, and some amphibian life stages (e.g., tadpoles and metamorphs) can become entrapped in isolated pools that are created as part of the construction, or that develop naturally after construction as channels reconfigure in active floodplains. Aquatic species may also be impinged on netting or screens. Wildlife will likely become entrapped in fencing and other construction material as they disperse through the project area. Some of the effects associated with entrapment may be temporary (such as physical handling to remove the individual), others (such as burial) may be permanent and lethal.

Implementation of GPMs in Section 2.1.5, *Protection Measures,* would significantly avoid or reduce these effects by limiting the potential for Covered Species to be present in active construction areas (through biological monitoring, use of appropriately sized mesh or bio fabrics, and/or placement of physical barriers over open-pits). In addition, guild- and species-specific measures (Section 2.1.5.2.2, *Dewatering Activities and Aquatic Species Relocation*) would limit construction activities to periods of limited species activity, further reducing the changes of entrapment and entanglement.

The Proposed Restoration Effort includes general and species protection measures to minimize the potential for Covered Species to be present in or attracted to construction areas; however, it is possible that limited numbers of individuals could remain present through an exclusion or relocation effort or could gain access to a construction area following implementation of protection measures. These individuals could become entrapped in project-related structures or construction materials while seeking cover.

3.4.5. Species Handling and Relocation

Some restoration activities, especially dewatering of aquatic sites, will likely require handling and relocation of Covered Species. Some animal species may also need to be relocated if they enter the active construction area and do not vacate on their own. Once captured, aquatic animal species may need to be temporarily placed in holding tanks, such as buckets, with limited water flow and reduced water quality, such as low DO and elevated temperatures. In specialized aquatic habitats, such as vernal pools, Covered Species of invertebrates may be present but dormant in the soil; and Covered Species of perennial plants may require relocation, if on federal land. To relocate covered perennial plants, top soil layers would need to be removed, temporarily stockpiled, and replaced following grading activities. Dormant invertebrates, as well as seeds of Covered Species of vernal pool plants, could be permanently lost if soil handling is not performed adequately.

Implementation of protection measures, including GPMs for water quality, erosion, and sediment control, will reduce contamination in and around habitat that could support aquatic Covered Species, and therefore reduce stress on Covered Species requiring relocation. In addition, effects specific to dewatering would be avoided and minimized with implementation of protection measures described in Section 2.1.5.2.2, *Dewatering Activities and Aquatic Species Relocation;* these measures address appropriate cofferdam construction, dewatering and diversion practices, and aquatic species exclusion. Implementation of these measures would reduce disturbance to Covered Species by minimizing the disturbance area, extent, and duration. Guild- and species-specific protection measures (e.g., FISH-3, AMP-11, REP-6, and CAFS-4) would require projects to follow specific protection measures for species handling and relocation, implementing best practices to minimize negative effects to Covered Species of plants and animals.

Despite implementation of general and species-specific measures to avoid and minimize species handling and relocation effects to Covered Species, it is possible that relocation efforts—including handling, temporary containment and/or release—could still create stressful conditions for individual Covered Species, leading to reduced vigor, habitat abandonment, or even mortality.

3.4.6. Habitat Disturbance or Loss of Habitat

Habitat loss and disturbance activities that could adversely affect Covered Species and associated critical habitat include the general and specific types described below.

- **Removal of vegetation that serves as breeding, foraging, or sheltering habitat for Covered Species.** Vegetation will likely be temporarily disturbed or can be permanently lost or converted when new habitat types are established. Although the project types in the Proposed Restoration Effort seek to restore and improve ecological function, a Proposed Restoration Project could result in permanent conversion of vegetation type (e.g., cattails to salt marsh). More details on effects of the removal of riparian vegetation (some of which apply to other habitat types as well) are described in the "Removal of Riparian Vegetation" item below. Some Covered Species will use non-native vegetation for breeding, foraging and

sheltering, and as such, although there is a long-term benefit, short-term adverse effects will likely occur from non-native plant removal efforts.

- **Excavation/removal of soil.** Physical removal of soil during a project could remove or compromise seed banks and vegetative propagules of Covered Plant Species, directly reducing natural recovery potential or indirectly reducing genetic diversity, and increasing the burden of the genetic load on the extant individuals.
- **Removal of in-channel habitat structure.** Accumulation of woody debris in shallow waters will likely create hazardous conditions (such as after a flood event) necessitating the removal of material that otherwise contributes to complex habitat and provides refuge for Covered Species of aquatic wildlife. These impacts are expected to be temporary because habitat complexity will be built into restored areas, where ecologically appropriate.
- **Placement of fill in wetlands.** To achieve the desired overall site ecological benefit, some areas of wetlands or waters may need to be temporarily or permanently filled, or those areas may remove or fragment habitat and alter nearby vegetation. Transitional zones may be installed along wetland fringes to increase sea-level resiliency and provide high-tide refugia. Although these losses may be permanent, they result in an overall net benefit to ecosystem health, which in turn could benefit Covered Species.

  As described in Section 2.1.3, *Eligible Project Types and Design Guidelines*, limited placement of rock may be necessary in some cases, such as to protect or anchor bioengineered features or to protect bridge abutments or other infrastructure. Placement of rock within or on the banks of aquatic habitat could prevent vegetation from establishing in those areas or may reduce the influence of natural processes. However, use of excess riprap or other hard armoring of banks is prohibited, other than the minimum amount needed to achieve project goals, as determined by the Lead Action Agency in coordination with the USFWS Field Office (see Section 2.1.1, *Prohibited Activities*). For example, as described in Section 2.1.3, *Eligible Project Types and Design Guidelines* rock may be installed consistent with restoration or streambank stabilization techniques described in Parts XI and VII of the CDFW Stream Restoration Manual, respectively. Because limited rock would be incorporated into restoration projects to support beneficial project elements, the net effect of rock placement would have an overall benefit for native species and habitats.
- **Removal of water impoundments.** Removal of small dams and structures that impound water (natural or human-made) will likely lead to permanent losses of water or wetland habitat, such as the loss of reservoirs. In many cases, especially cases where these structures were human-made, these projects restore more natural habitats and improve ecosystem functionality, actions which have an overall net benefit for native species.
- **Alteration of hydrology.** The proposed restoration projects may result in the temporary or permanent alteration of hydrology, which will likely affect vegetation communities, food webs, and species that require aquatic features in stages of their life history. This can include raising or lowering of the water table; reduction or increases in water impoundment; reconfiguration of channels; alteration of flow volume and velocity; changes to vernal pool

watersheds; effects on the size and extent of the tidal prism; decreases in the rate of runoff; increases in rates of groundwater recharge; and other changes. The installation or expansion of levees, breakwaters, bulkheads, and revetments may permanently reduce the amount of shallow water habitat available, but the placement of such structures may also be necessary to protect against high rates of erosion or wave activity. Permanent changes in hydrology as a result of restoration projects would produce a net benefit to target species and habitats.

- **Barriers to movement.** Short-term partial or localized blockages to migration and movement could temporarily affect species during construction. Barriers to movement and migration could result from activities such as the fencing and equipment staging during restoration. Disturbance to or removal of stream habitat features (e.g., vegetation, large woody debris, boulders, or gravel) could also discourage individuals of a Covered Species from attempting to move through the disturbed stream section or could increase the chance of predation during movement. Visual and noise disturbances (described below) could also negatively affect the quality of dispersal habitat and limit movement. After restoration, it is expected that existing conditions will improve, thus facilitating dispersal and movement. Because these impacts would be temporary, it is not expected that habitat would be altered in a way that would have long-term and substantial negative effects on a majority of the local population(s). However, where there may be a minority of species with altered habitat impeding movement; monitoring would be necessary to minimize effects, and adaptive management commensurate with project complexity might also be necessary.
- **Removal of riparian vegetation.** Proposed projects may require the trimming or removal of riparian vegetation for temporary access during construction. These may be short-term (e.g., during construction only) or long-term modifications; but restoration projects will generally lead to an increase in native vegetation cover over time. The short-term removal of riparian vegetation may reduce prey availability and increase predation because of 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 will likely cause stress to fish and allow warm-water fish species, which may compete with or prey on Covered Species of fish, to establish residence (EPA 2001).

  For some Covered Species of birds, the removal of vegetation could result in reduced habitat quality and quantity and complexity of the areas adjacent to the project areas and in the landscape context. For example, tree removal in suitable foraging, dispersal, roosting, or nesting habitat could have an effect on birds if the tree species composition, structural diversity, or density of the habitat is significantly and permanently changed. Removal of single large trees or extensive smaller shrubs, particularly in riparian areas, may affect bird nesting, roosting, and perching. The removal of riparian vegetation will likely reduce the amount of large woody debris that enters into aquatic habitat. Large woody debris in the

stream helps retain gravel for spawning habitat; creates pools and habitat complexity; provides long-term nutrient storage and substrate for aquatic invertebrates on which Covered Species may prey; and provides refuge for aquatic species and their prey during high- and low-flow periods (Spence et al. 1996). The likelihood and severity of adverse effects related to riparian habitat removal and/or degradation is largely dependent on the quality, quantity, and nature of riparian habitat affected; such effects increase with the size of riparian habitat affected. Adverse effects are expected to be temporary, however, and overall net environmental benefits expected to occur as native vegetation matures and becomes reestablished.

To avoid and minimize habitat disturbance or loss of Covered Species habitat, projects will consider, as part of the project design, the goals of Recovery Plans for site-appropriate Covered Species. Adverse effects to habitat will be further avoided and minimized by considering applicable project design guidelines described in Section 1, *Requirements for Coverage* (*Eligibility Criteria),* and applicable protection measures in Section 2.1.5, *Protection Measures*.

3.4.7. Earth Moving in and Around Vernal Pools

Any of the Covered Species of vernal pool Branchiopoda, other invertebrates, and plants could be affected by the loss or alteration of vernal pool habitat. Vernal pool habitat occupies areas with specific soil, geology, and micro-topography and is, therefore, very susceptible to degradation from earth-moving activities. Many vernal pool areas contain hardpan soils that, if disturbed, will no longer hold water appropriately. Vernal pools also rely on runoff during winter rains from surrounding areas, for filling. Regrading of these areas may affect the flow of water and alter the amount of water entering the vernal pool. These mechanisms, as well as effects from erosion, dust, and construction activities during restoration implementation, may temporarily alter vernal pool habitat, making such areas less suitable for the Covered Species that occupy the habitat. Where the reach of these effects cannot be determined definitively, all habitat within 250 feet of construction activities may be considered to be indirectly affected (USFWS 1996c). Although grading, excavation, and filling may occur outside of a vernal pool, effects on vernal swales and vernal complexes may still occur. Typically, if any portion of a vernal pool is affected, then the entire vernal pool is considered affected. Dry season construction (including construction access) that occurs in vernal pool areas may also result in take of Covered Species of vernal pool Branchiopoda because their cysts may be present in the soil.

Implementation of protection measures, particularly the general measures for vegetation/habitat disturbance and revegetation (Section 2.1.5.2.3, *Vegetation/Habitat Disturbance and Revegetation*), would avoid and minimize effects to Covered Species associated with earth moving in and around vernal pools by requiring the project to identify sensitive habitat in advance of construction; and by requiring contractors to carefully implement all vegetation removal and revegetation activities, to minimize disturbance to remaining habitat. In addition, implementation of measures PLANT1 through PLANT7 will provide a clear delineation of any vernal pool habitat in the project footprint and will provide seasonal and equipment operation

limitations appropriate to protecting vernal pool resources. Despite implementation of protection measures, earth moving in and around vernal pools may be an unavoidable component of some restoration projects and could have an adverse effect on covered vernal pool plants and animals.

3.4.8. Reductions in Water Quality

Some of the ways in which proposed restoration projects could affect (i.e., reduce) water quality are described in this section. High-quality water is critical for supporting the different life stages of many Covered Species. Water quality needs vary by species, but typically high-quality water is characterized by low concentrations of pollutants, limited turbidity, roughly neutral pH, high DO, and cool to moderate temperatures.

3.4.8.1. Erosion, Turbidity, Temperature, Dissolved Oxygen, and Sedimentation

Increased erosion, turbidity, temperature, and sedimentation, as well as reduced DO, may affect aquatic organisms in many ways, including reduced visibility of prey or forage items; respiratory stress; changes in temperature regimes; and, in severe cases, damage to gills, lungs, or other organs. During project implementation, sediments may enter water bodies or become suspended in the water column through soil or substrate disturbances resulting from the use of heavy equipment. This occurs particularly during in-water work activities, such as the installation of temporary diversions and cofferdams, or dewatering. Project activities may result in the deposition of dust onto nearby waters and vegetation, and in increased erosion and sedimentation during storm runoff from terrestrial or riparian vegetation removal activities. These sediments may appear as localized increases in turbidity due to resuspension of fine sediments and may result in burial of existing substrates when resuspended sediments settle. Turbidity increases may also occur when a water source re-enters dewatered areas after the removal of work area isolation structures (e.g., cofferdams). The duration of the increased turbidity and sedimentation depends on several factors, including:

- The nature of vegetation, soils, and sediments
- The flow or current velocities
- The type of erosion-control structures installed
- The amount of area that was originally disturbed and the local topography
- 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
- The duration and expected vegetation growth between the completion of the activity and onset of high flows or heavy rains

Sediment effects generated by project implementation will likely impact only the immediate footprint of the project site and habitat immediately downstream. Effects to instream habitat and fish are expected to be short-term because most project-related sediment will likely mobilize

during the initial high-flow event the following winter season. The slightly elevated concentrations of sediment and turbidity expected from the proposed restoration activities are unlikely to be severe enough to cause injury or death of fish. Instead, the anticipated minor levels of turbidity and suspended sediment resulting from instream restoration projects will likely result in only temporary behavioral effects. In addition, any remaining suspended sediment would resettle following the cessation of activities or be carried through lotic systems. Eligible project types, in many cases, would also be subject to the permitting process under sections 404 and/or 401 of the Clean Water Act with USACE and State Water Board, respectively. Therefore, erosion, turbidity, and sedimentation are anticipated to be reduced to minimal levels or compensated for over the long-term.

3.4.8.2. Spills or Hazardous Materials

Chemical contamination of soil or water sources could occur from equipment leaks (e.g., diesel fuel, oil, hydraulic fluids, or antifreeze), refueling spills, or an accidental spill during project implementation. In addition to toxic chemicals associated with construction equipment, water that comes into contact with wet cement during the construction of a restoration project will likely adversely affect water quality and may harm Covered Species. Ground disturbance or in-water work, such as sediment and debris removal, may occur in areas of minor or unknown contamination; disturbance of contaminated soils could temporarily decrease local water quality.

Short-term effects of accidentally spilled hazardous material could include mortality of Covered Species, their prey, or plants that provide habitat. A high concentration of hazardous material may cause suffocation or poisoning of Covered Species. Spilled hazardous materials could also injure Covered Species or their prey 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 Covered Species or their prey. Protection measures for staging and stockpiling of materials (see Section 2.1.5.2.2, *Staging and Stockpiling of Materials*), as well as WQHM-4, *Hazardous Materials Management and Spill Response*, would be implemented. These measures would minimize the chances of an accidental spill occurring and would reduce effects associated with an accidental spill, should one occur.

3.4.8.3. Temporary Water Quality Effects

Other water quality effects that could occur as a result of restoration projects include short-term effects on DO, water temperature, or pH. Some Covered Species require minimum thresholds for these constituents or can only survive within a specific range. Species with gills that intake oxygen through water require minimum amounts of DO to support respiration. Projects could temporarily affect these water quality elements through actions such as spills (noted above), vegetation removal, and water stagnation due to constricted or reduced flows.

Most of the proposed restoration projects would have long-term benefits for water quality, such as stabilizing erosional areas, slowing the movement of water through aquatic habitats, increasing riparian shading, and reducing temperatures in aquatic habitats. Implementation of the

protection measures in Section 2.1.5, *Protection Measures,* would largely avoid or reduce effects because most erosion, turbidity, and sedimentation effects would be temporary, short-term, and avoidable. Despite implementation of the protection measures described in Section 2.1.5, *Protection Measures,* which are aimed at protecting water quality and the Covered Species that depend on it, some negative water quality effects may be unavoidable and could adversely affect Covered Species by reducing habitat quality, reducing the availability of prey, or contributing to limited mortality of individual Covered Species.

3.4.9. Invasive Species and Pathogens

Invasive species will likely injure or kill Covered Species or harm them by reducing prey abundance or detrimentally affecting aquatic and riparian vegetation. During restoration implementation, invasive species and pathogens will likely be introduced to an area when contaminated construction equipment or restoration materials are moved from a site containing the invasive species or pathogen to an uninvaded or uninfected site. Seeds, propagules, and pathogens embedded in mud, soil, or other debris can also be transferred to an uninvaded site via construction equipment, vehicles, clothing, or boots of those working at the site. During in-water work, invasive species and pathogens will likely be introduced to a water body if vessels and equipment are inadequately cleaned prior to transfer between invaded and uninvaded sites. Plant pathogens may be introduced from contaminated construction equipment, nursery plant material, mulches, imported soil, hand tools, boots, gloves, or irrigation water from residential runoff used during restoration implementation and the monitoring and maintenance periods. For instance, the accidental introduction of chytrid fungus into an area could have significant adverse effects on Covered Species of amphibians. 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). Although Bd prevalence in wild amphibian populations in California is unknown (Fellers et al. 2011), chytrid is expected to be widespread throughout much of California. Chytrid infection may not directly lead to mortality in amphibian populations, but Padgett-Flohr (2008) states that this infection may reduce overall fitness and could lead to long-term effects.

Once introduced, invasive plant species will likely be adversely affect Covered Species and their habitat through resource competition and predation. Pathogens will likely injure or kill Covered Species or harm them by reducing prey abundance or detrimentally affecting aquatic and riparian vegetation. Invasive plant species may outcompete and crowd out Covered Plant Species, as well as the host plants for the Covered Species of butterfly. These effects will likely be long-term; once invaded, it may be difficult to control or eradicate an invasive pest or pathogen.

Implementation of the protection measures provided in Section 2.1.5*, Protection Measures*—particularly those aimed at reducing disturbance area and extent, such as GPM-7, *Environmentally Sensitive Areas and/or Wildlife Exclusion*, all general in-water measures (IWW-1 through IWW-4), and IWW-6, *Dewatering/Diversion*—would avoid and minimize the spread of invasive species and pathogens by limiting the area available to contamination sources. Two other protection measures—GPM-8, *Prevent Spread of Invasive Species*; and GPM-9,

Practices to Prevent Pathogen Contamination—have been developed to reduce the introduction of invasive species and pathogens into proposed restoration sites, by requiring project compliance with the most current guidance. Environmental Awareness Training, outlined in GPM-4, would also minimize the potential for invasive species and pathogen contamination, by making construction workers aware of behaviors that pose a risk to Covered Species survival and habitat integrity. Despite implementation of protection measures, there still remains some risk that pathogens could be introduced into a project site and could cause adverse effects to Covered Species through habitat disruption or Covered Species mortality.

3.4.10. Noise and Vibration Disturbance and Interference

Noise and vibration, as well as light interference from construction activities, may have adverse effects on Covered Species. Pile driving (including sheet piles used for cofferdams and dewatering) and in-water drilling, cutting, or excavation will likely have short-term adverse effects on Covered Species of aquatic wildlife by increasing in-water noise and vibration. For example, when piles are driven into or adjacent to water, the high-intensity sound acts as a pressure wave that will likely cause barotrauma or harassment to fish (FHWG 2008). Barotrauma is the term used to describe the damage inflicted to soft tissue, such as the swim bladder or eyes, resulting from sudden changes in pressure caused by intense underwater sound. Vibratory driving produces less intense noise than impact driving; it is unlikely to cause barotrauma but may still cause temporary shifts in hearing thresholds or alter behavior of Covered Species. Project-related underwater noise and disturbance resulting from in-channel work may cause behavioral changes in Covered Species, such as dispersal or avoidance behavior, which could temporarily disrupt normal movements. Increases in turbidity and sedimentation due to project activities could impair visibility and navigation, thereby adversely affecting movement. Noise from the operation of other cutting, drilling, or excavation equipment is not anticipated to result in injury or mortality of Covered Species of aquatic wildlife, but it may cause temporary changes in behavior.

The movement and operation of heavy equipment during restoration implementation, such as vibratory pile driving, impact pile driving, drilling, cutting, or excavation, will likely also have adverse effects on Covered Species by increasing noise and vibration above the water. Noise and vibration may affect Covered Species' nesting or breeding, foraging, predator evasion, and dispersal or migratory behavior, and could produce adverse physical effects that may include temporarily affecting hearing capacity. Noise and vibration from project activities may result in nest abandonment, fleeing, and temporary cessation of feeding or courtship behaviors, or cause physical harm when noise levels are substantially higher than existing background noise levels. The significance of the effects depends on the noise and vibration source, ambient noise and vibration levels, duration of the effects, physical and biological characteristics of the project site and adjacent areas, proximity, and physiology of the Covered Species. These effects are anticipated to be mostly temporary in nature and likely limited to the restoration implementation period.

Lights are known attractants to a variety of insect species and will likely attract Covered Species of night-flying birds. The effects of light disturbance could arise from temporary nighttime construction activities that require lighting. Effects to Covered Species of birds would be primarily associated with changes in behavior and are expected to be sublethal. Lights and other visual disturbances (such as humans working close to foraging areas) may cause disruption, such as disorientation in local, seasonal, or long-distance dispersal or migration events. These effects would be temporary but could alter breeding or foraging behaviors or affect the ability of species to find or return to breeding territories during restoration implementation. These effects are expected to be the most pronounced near the light or visual disturbance source, and less pronounced at distances far away from the source. Any of the Covered Species of wildlife will likely be affected by noise and sound pressure; however, the implementation of general, and guild- and species-specific protection measures in Section 2.1.5, *Protection Measures,* would avoid or reduce these effects; particularly IWW-9 through IWW-12, which all address methods for reducing effects associated with in-water pile driving. Noise, motion, and vibration produced by heavy equipment operation, including pile driving, may be present at most restoration sites, and in most situations it is anticipated that Covered Species of fish, birds, and highly mobile amphibians, reptiles, and mammals will be able to avoid interaction with instream machinery by temporarily relocating either upstream or downstream into suitable habitat adjacent to the worksite. Despite the limited anticipated effects to Covered Species, specific measures may be necessary to protect Covered Species in some situations, especially less-mobile Covered Species. Despite implementation of general and guild- and species-specific protection measures, noise and vibration disturbance may not be completely avoidable during construction, and limited adverse effects to Covered Species may occur. To avoid and minimize effects associated with light interference, protection measures such as GPM-3, *Construction Hours*; and AMP-2, *Rain Event Limitations*, discourage night work. Most restoration projects will be constructed during the day, but some activities may benefit from night work, particularly when seasonal restrictions aimed at reducing other impacts require an accelerated construction schedule. In these cases, protection measures such as directional lighting can be used to help reduce but not eliminate the interference effects associated with construction lights.

3.4.11. Effects from Dust

The use of heavy equipment for ground-disturbing activities may result in soil erosion and the generation of fugitive dust during and following construction activities that require access improvements, substrate disturbance, or vegetation removal. The duration of effects from the erosion and dust depends on several factors, including:

- The type of soils and sediments in a project site
- The type of erosion-control structures installed at the project site
- The amount of rainfall, the size of the area that is disturbed, and the local topography of the project site

- The duration and magnitude of expected vegetation growth between the completion of the activity and the onset of heavy rains

Effects on Covered Species could occur as a result of fugitive dust from project activities. These effects may occur in the project footprint or may be affecting species and habitats outside of the project area. Dust could result from project activities that require ground disturbance, or from post-project construction if appropriate site restoration or temporary measures to limit dust do not occur. Dry conditions, wind, and exposed soil can lead to the airborne suspension and migration of dust particles outside the project area, where they can be deposited. Deposition of dust could lead to a number of effects on Covered Species; these effects are expected to be sublethal. Effects of dust may include degradation of habitat or water quality, reduced ability for Covered Species of plants to complete life history (reproduction or respiration), and decreased pollination.

Any of the Covered Species that are not strictly aquatic will likely be affected by erosion and dust in terrestrial habitat; however, the implementation of the protection measures in Section 2.1.5, *Protection Measures,* such as wetting dry roads and not working in windy conditions, would avoid or reduce these effects. Successful implementation of proposed GPMs addressing dust control, such as those in Section 2.1.5.2.2, *Staging and Stockpiling of Materials* and *Erosion and Sedimentation Control Measures*; and GPM-6, *Work Area and Speed Limits,* should effectively remove adverse effects from dust during qualified restoration projects.

3.4.12. Dewatering Activities

Dewatering encompasses placing temporary barriers, such as a cofferdam, to isolate the work area; rerouting or isolating natural hydrology around the dewatered area; pumping water out of the isolated work area; relocating aquatic species from the work area; and restoring the project site on project completion. For projects involving in-water work, dewatering may be necessary to properly install structures, reduce turbidity, and reduce direct injury to Covered Species. Species that are not relocated from dewatered areas may be killed by either dewatering or materials placement. If the area to be dewatered is occupied by Covered Species, take of that species may occur. During dewatering, capture and relocation may be performed in waters occupied by Covered Species, which is considered take of a Covered Species. Dewatering, rescue, and relocation of a Covered Species can cause mortality of a small percentage of individuals. To minimize adverse effects, Covered Species (i.e., fish and amphibians) would be captured and relocated away from the project work site. Covered Species in the area to be dewatered would be captured by seine, dip net, or electrofishing and then transported and released at a suitable location.

Any relocation, whether passive or active (Hayes 1983), has some associated risk to Covered Species, including stress, disease transmission, injury, or death. Handled species could have minor abrasions from the net and short-terms effects from handling. The amount of injury and mortality attributable to fish capture varies widely, depending on the method used, the ambient conditions, and the expertise and experience of the field crew. The effects of seining and dip-netting on juvenile salmonids, for example, include stress, scale loss, physical damage,

suffocation, and desiccation. Electrofishing will likely kill juvenile salmonids, and researchers have found serious sublethal effects, including spinal injuries (Nielsen 2011; Snyder 2003). The long-term effects of electrofishing on fish are not well understood. Although chronic effects may occur, most effects from electrofishing occur at the time of capture and handling. Dewatered habitat may temporarily reduce forage value for Covered Species due to the loss of benthic aquatic macroinvertebrates (prey for covered birds, amphibians, and fish [Cushman 1985]). Effects to aquatic macroinvertebrates resulting from diversions and dewatering will be temporary because construction activities will be relatively short-lived, and rapid recolonization (about 1 to 2 months) of disturbed areas by macroinvertebrates (Cushman 1985; Thomas 1985; Harvey 1986) is expected following rewatering in most situations. In addition, the effect of macroinvertebrate loss on fish is likely to be negligible; food from adjacent sources (via drift) would still be available outside of the dewatered areas because hydrology will be maintained around the project work site in typical situations. Aquatic species will likely also be killed by desiccation after a reach is dewatered. Project work area dewatering is expected to cause temporary loss, alteration, and reduction of aquatic habitat for aquatic species. The extent of temporary loss should be minimal because habitat at proposed restoration project sites is typically degraded, and only a small amount of contiguous aquatic area is typically dewatered. These sites will be restored prior to project completion and will be enhanced by the restoration project.

Implementation of specific protection measures for dewatering activities, including measures in Section 2.1.5.2.2, *Dewatering Activities and Aquatic Species Relocation* (IWW-5 through IWW-8), in addition to those related more generally to species handling, will reduce Covered Species mortality associated with dewatering activities. Dewatering effects would generally be limited in geographic extent and would be temporary in nature.

3.4.13. Effects from Herbicide Use

Overall, proposed projects that would be appended to this consultation, that include application of herbicides to control invasive plant species, are expected to have a long-term benefit to native vegetation communities and any Covered Species present within those communities. The removal of non-native plant species would allow native species to reestablish in treated areas. This would benefit species composition and diversity, which are equally important contributors to ecosystem function. However, herbicide use for removal of invasive plant species could cause adverse effects to covered plant and animal species. Effects of herbicide use include direct impacts from herbicides unintentionally reaching non-target species. Effects also include indirect effects of short-term loss of shading and habitat provided by the invasive plants and a potential reduction in pollinators since herbicide contact can reduce foraging success of bees, disrupt navigation, reduce lifespan, and disrupt the population biology of pollinators (i.e., lowering pollinator abundance even if not causing mortality) (Vanbergen and the Insect Pollinators Initiative 2013). A reduction in pollinator abundance will likely affect pollinator-dependent plant species and communities such as vernal pools by reducing pollination and seed set.

Possible adverse effects to individual animals resulting from direct contact with or ingestion of treated vegetation include death, damage to vital organs, decrease in body weight, decrease in healthy offspring, and increased susceptibility to predation, depending on exposure length and amounts (SERA 2003a). In addition, species feeding on animals that have been exposed to high levels of herbicide would be more likely to be affected, particularly if the herbicide bioaccumulates in their systems. Adverse effects include a reduction in plant species diversity and consequent availability of preferred food, habitat, and breeding areas; decrease in wildlife population densities within the first year following application, as a result of limited reproduction; habitat and range disruption (because wildlife may avoid sprayed areas following treatment), resulting in changes to territorial boundaries and breeding and nesting behaviors; and increase in predation of small mammals due to loss of ground cover.

Spray and vapor drift are important pathways for herbicide entry into aquatic habitats. Several factors influence herbicide drift, including spray droplet size, wind and air stability, humidity and temperature, physical properties of herbicides and their formulations, and method of application. For example, the amount of herbicide lost from the target area and the distance the herbicide moves both increase as wind velocity increases. Under inversion conditions, when cool air is near the surface under a layer of warm air, little vertical mixing of air occurs. Spray drift is most severe under these conditions, since small spray droplets will fall slowly and move to adjoining areas even with very little wind. Low relative humidity and high temperature cause more rapid evaporation of spray droplets between sprayer and target. This reduces droplet size, resulting in increased potential for spray drift. Vapor drift will likely occur when herbicide volatilizes. The formulation and volatility of the compound will determine its vapor drift potential.

When herbicides are applied with a sprayer, nozzle height controls the distance a droplet must fall before reaching the weeds or soil. Less distance means less travel time and less drift. Wind velocity is often greater as height above ground increases, so droplets from nozzles close to the ground would be exposed to lower wind speed. The higher that an application is made above the ground, the more likely it is to be above an inversion layer that will not allow herbicides to mix with lower air layers and will increase long distance drift.

Surface water contamination with herbicides will likely occur when herbicides are applied intentionally or accidentally into ditches, irrigation channels or other bodies of water, or when soil-applied herbicides are carried away in runoff to surface waters. The contribution from runoff will vary depending on site and application variables, although the highest pollutant concentrations generally occur early in the storm runoff period when the greatest amount of herbicide is available for dissolution (Stenstrom and Kayhanian 2005; Wood 2001). Lower exposures are likely when herbicide is applied to smaller areas, when intermittent stream channel or ditches are not completely treated, or when rainfall occurs more than 24 hours after application. Under the proposed action, some formulas of herbicide can be applied within the bankfull elevation of streams, in some cases up to the water's edge.

Groundwater contamination is another important pathway. Most herbicide groundwater contamination is caused by "point sources," such as spills or leaks at storage and handling

facilities, improperly discarded containers, and rinses of equipment in loading and handling areas, often into adjacent drainage ditches. Point sources are discrete, identifiable locations that discharge relatively high local concentrations.

More information for each of the herbicides proposed for use as part of non-native, invasive plat control and removal activities is provided below. Such information was copied directly from Syracuse Environmental Research Associates, Inc. (SERA) toxicity assessments (https://www.fs.fed.us/foresthealth/protecting-forest/integrated-pest-management/pesticide-management/pesticide-risk-assessments.shtml).

2,4-D amine (SERA 2006a)

Adverse effects on aquatic animals are not likely with formulations of 2,4-D salts except for accidental and extreme exposures at the upper ranges of application rates. The ester formulations of 2,4-D are much more toxic to aquatic animals and adverse effects are plausible in sensitive species and sometimes in relatively tolerant species. It is slightly toxic to mammals; practically non-toxic to moderately toxic to birds; and practically non-toxic to honey bees. The US EPA classifies the toxicity of 2,4-D to freshwater and marine fish as practically non-toxic for 2,4-D acid/salts and highly toxic for esters (USEPA 2005a). A similar pattern of toxicity is observed for aquatic invertebrates and amphibians. 2,4-D does not cause effects on reproduction or fetal development in birds or mammals at exposures which do not cause toxic effects in maternal animals. The only available studies which address the potential for 2,4-D to have an adverse effect on the early growth and development of fish were conducted on fathead minnows.

Protection Measure: If a Project Proponent uses 2,4-D amine, this action requires a 15-foot buffer when hand-applied, and a 50-foot buffer when it is applied using a backpack sprayer.

Aminopyralid (SERA 2007)

Results of the aminopyralid risk assessment analysis conclude that sensitive fish species exposed to the proposed maximum application rate have an extremely small potential to receive doses that are above the toxicity index. The USEPA Pesticide Fact Sheet for aminopyralid (USEPA 2005b) states that it has been shown to be practically non-toxic to fish and is not expected to bio-accumulate in fish tissue. This same fact sheet gives a 96-hour Lethal Concentration 50 (LC50) aminopyralid dosage of 100 mg/L [using the USEPA uncertainty factor No Observed Effect Concentration (NOEC) = 20 mg/L] for rainbow trout and a NOEC of 1.3 mg/L for young fathead minnows (*Pimephales promelas*). Results of the aminopyralid risk assessment analysis (SERA 2007) conclude that sensitive amphibian species exposed to the proposed concentrations have an extremely small potential to receive doses that are above the toxicity index (HQ=0.002, Appendix B, Table 6). The USEPA Pesticide Fact Sheet for aminopyralid (USEPA 2005b) gives a 96-hour LC50 (Lethal Concentration 50%) dosage of 95 mg/L (using the USEPA uncertainty factor NOEC= 19 mg/L) for northern leopard frog. The 2007 report

also concluded that there is no indication that other groups of organisms will be adversely affected by aminopyralid. These groups include tolerant species of terrestrial plants (such a grasses), aquatic plants (algae or macrophytes), mammals, birds, aquatic or terrestrial invertebrates, terrestrial microorganisms, fish, and amphibians.

Chlorsulfuron (SERA 2016)

Results of the chlorsulfuron risk assessment analysis conclude that sensitive fish species exposed to the proposed concentrations have an extremely small potential to receive doses that are above the toxicity index. The USEPA Pesticide Fact Sheet for chlorsulfuron (USEPA 2005c) states that it is practically non-toxic to fish on an acute exposure basis. The SERA risk assessment for chlorsulfuron does not include toxicity assessments for amphibians, and no information on toxicity information on amphibians was identified in a review of literature.

Adverse effects in mammals, birds, terrestrial insects, and microorganisms are not likely at the typical application rate of 0.0625 lb. active ingredient/acre (a.i./ac.). One study suggests that latent/sublethal chlorsulfuron toxicity to one plant species could result in adverse reproductive effects in one species of beetle that consumes the leaves of the affected plant. This appears to be a highly specific plant-insect interaction that is not confirmed in publications by other groups of researchers.

Chlorsulfuron appears to have a very low potential to cause any direct adverse effects in aquatic animals. All of the upper bounds of the HQs for aquatic animals are extremely low, ranging from 0.0001 (acute exposures in tolerant fish) to 0.002 (acute exposures to sensitive aquatic invertebrates).

Clethodim (SERA 2014)

While risks to grasses are to be expected given the labelled uses of clethodim (i.e., the control of grasses), the limited data also suggest that longer-term exposures associated with applications of clethodim may adversely impact sensitive species of fish. Confidence in the risk characterization for longer-term exposures of fish to clethodim is low, however, due to limitations in the toxicity data. Confidence in the risk characterization for fish would be enhanced substantially by a confirming early life stage study in fathead minnows and by early life stage studies in other potentially more sensitive species of fish such as trout. Risks to other groups of aquatic organisms appear to be minimal. For terrestrial animals, risks to mammals can be well characterized but it is more difficult to characterize risks to other groups of terrestrial animals because of limitations in the available data on birds and terrestrial insects as well as the lack of toxicity data on amphibians and reptiles. Some acute exposure scenarios for a small (20 g) mammal modestly exceed the level of concern at the upper bound of plausible exposures but serious effects on mammals do not seem likely. Similarly, the potential for direct effects on birds associated with acute exposures appears to be low. Longer-term exposures for a small (10 g) bird, however, exceed the level of concern by factors of

about 2 to 4 for two applications of clethodim. While the magnitude of these HQs is not substantial, serious adverse effects on the offspring of birds (i.e., mortality and decreased hatching) cannot be ruled out.

Protection Measure: This Program is not allowing it for broadcast application; it is allowed for hand application and backpack sprayer, both with a 50-foot buffer.

Clopyralid (BLM 2014)

Based on a review of available ecotoxicological literature, clopyralid is characterized as not acutely toxic via dermal and oral routes of exposure to mammals. This qualitative evaluation indicates that salmonids are not likely to be indirectly impacted by a reduction in food supply (i.e., fish and aquatic invertebrates). However, a reduction in vegetative cover may occur under limited conditions. No conclusions can be drawn regarding the sensitivity of amphibians to exposure to clopyralid relative to the surrogate species selected for the ERA.

Protection Measure: Allowed up to the waterline (for hand application) but requires a 100-foot buffer for broadcast application. The Proposed Restoration Effort only allows for one treatment per year.

Dicamba (SERA 2004a)

The acute toxicity of dicamba to birds appears generally to be low and consistent with the gavage studies in rats. Very little information is available on the toxicity of dicamba to terrestrial invertebrates. In the honey bee, the acute lethal dose is greater than 1000 mg/kg body weight. Dicamba is an effective auxin herbicide and acts by mimicking the plant hormone indole-3-acetic acid. There is very little indication that dicamba will adversely affect soil microorganisms. Acute toxicity studies in fish indicate that dicamba is relatively non-toxic, with 24- to 96-hour LC50 values in the range of 28–516 mg/L, although salmonids appear to be more sensitive than other freshwater fish to the acute toxicity of dicamba. Amphibians seem to have a sensitivity to dicamba that is similar to that of fish with 24- to 96-hour LC values in the range of 166 to 220 mg/L. Some aquatic invertebrates appear to be somewhat more sensitive than fish and amphibians to the acute toxicity of dicamba, with lower ranges of Effect Concentration (EC) values of about 4 to 10 mg/L. Some but not all aquatic plants are much more sensitive to dicamba than aquatic animals, with LC values of about 0.06 mg/L. Other aquatic plants are much more tolerant, with reported NOEC values of up to 100 mg/L. The acute lethal potency of dicamba, expressed as the lethal dose, is relatively well characterized in several mammalian species, and indicates that larger vertebrates are more sensitive to dicamba than smaller vertebrates.

No information is available on the chronic toxicity of dicamba to aquatic animals and the available acute toxicity data do not permit reasonable estimates of toxicity values for chronic toxicity. This limits the risk characterization for aquatic animals. The available toxicity data on aquatic plants are relatively standard. The most sensitive species on

which data are available is the freshwater algae, Anabaene flos-aquae, with an EC of 0.061 mg 10 /L and an EC of 0.0049 mg/L. Other species of freshwater algae are much more tolerant with NOEC values of up to 10 mg/L. Aquatic macrophytes appear to have an intermediate sensitivity. At the highest application rate of 2 lb/acre, adverse reproductive effects are plausible in acute exposure scenarios involving mammals and birds consuming contaminated vegetation or contaminated insects. There is little basis for asserting that adverse effects would be expected in terrestrial insects or soil microorganisms. The very limited data in insects suggest that no lethal effects are likely in a direct spray. There are no data on sublethal effects in insects. Adverse effects in aquatic animals are plausible. At the typical application rate, adverse effects in aquatic plants are not likely. At the maximum application rate, peak concentrations in water could be associated with transient effects in sensitive species of algae as well as macrophytes. These concentrations, however, would rapidly diminish to levels substantially below a level of concern.

Protection Measure: Broadcast application of Dicamba will not be allowed for any project because of issues associated with drift.

Glyphosate (aquatic formulation) (SERA 2011a)

Fish, amphibians, and most aquatic invertebrates appear to be about equally sensitive to the toxicity of technical grade glyphosate and glyphosate formulations, and any differences in response to exposure are more likely attributable to experimental conditions, particularly pH, than to species differences. The sensitivity of algae to glyphosate and glyphosate formulations varies among species; however, the data regarding differences among species of aquatic macrophytes are less complete. Nonetheless, there is evidence that *Lemna* species are much more sensitive than eelgrass to glyphosate acid, which suggests that there may be substantial species differences in the sensitivity of macrophytes to glyphosate formulations. Most studies on aquatic microorganisms seem consistent with studies on terrestrial microorganisms, indicating that aquatic microorganisms are not very sensitive to glyphosate. Some recent studies using changes in the composition of ribosomal ribonucleic acid (RNA) and deoxyribonucleic acid (DNA) suggest that effects on aquatic microorganisms may occur at very low concentrations. While this may be the case, the functional significance of these effects is not apparent.

Applications of more toxic formulations of glyphosate at rates of up to 2.5-3 lb ae/acre do not appear to present any apparent risks to terrestrial animals, based on upper bound estimates of exposures. At application rates above 2.5 lb Glyphosate acid equivalent (ae)/acre, risks to mammals cannot be ruled out based on upper bound estimates of exposure, but no risks are apparent based on central estimates of exposure. At application rates above about 3.3 lb ae/acre, the HQs for birds modestly exceed the level of concern, but there is no basis for asserting that overt toxic effects in birds are likely. Risks to terrestrial insects are a greater concern in dietary exposures than direct spray. Based on

upper bound estimates of dietary exposure at the maximum application rate of 8 lb ae/acre, the HQs for terrestrial insects can reach a value of 10. Concern for terrestrial invertebrates is enhanced by two toxicity studies using South American formulations of glyphosate which noted adverse effects on reproduction and development. While most field studies suggest that effects on terrestrial invertebrates are due to secondary effects on vegetation, the field studies do not directly contradict the South American toxicity studies or the HQs. The less toxic formulations of glyphosate do not appear to present any risks to terrestrial organisms other than terrestrial plants. For the more toxic formulations, the risk characterization for aquatic organisms suggests that amphibians are the group at greatest risk both in terms of sensitivity and severity of effects.

Concern for amphibians is enhanced by the study by Howe et al. (2004) which indicates that two formulations of Roundup as well as the polyethoxylated tallowamine (POEA) surfactant used in some of the more toxic formulations of glyphosate are associated with the development of intersex gonads.

Imazapic (SERA 2006b)

Larger mammals, such as dogs and rabbits, may be more sensitive to imazapic than smaller mammals such as mice and rats. Essentially no toxic effects have been observed in rats and mice even at very high dietary concentrations of imazapic over prolonged periods of time. Aquatic animals appear to be relatively insensitive to imazapic exposures, with LC values of >100 mg/L for both acute toxicity and reproductive effects. Aquatic macrophytes may be much more sensitive, with an acute EC50 of 6.1 g/L in duck weed (*Lemna gibba*). Aquatic algae appear to be much less sensitive, with EC values of greater than 45 g/L. No toxicity studies have been located on the effects of imazapic on amphibians or microorganisms. Adverse effects in terrestrial or aquatic animals do not appear to be likely. The weight of evidence suggests that no adverse effects in mammals, birds, fish, and terrestrial or aquatic invertebrates are plausible using typical or worst-case exposure assumptions at the typical application rate of 0.1 lb/acre or the maximum application rate of 0.1875 lb/acre.

Protection Measure: Allowed up to the waterline with hand injection methods, 15-foot buffers for backpack sprayer application, and 100-foot buffers for broadcast application.

Imazapyr (SERA 2011b)

Imazapyr is of low toxicity to fish and invertebrates. The LC50s for rainbow trout, bluegill sunfish, channel catfish (*Ictalurus punctatus*), and the water flea (*Daphnia magna*) are all greater than 100 mg/L (SERA 2011b). While adverse effects on plants may be anticipated, there is no basis for asserting that applications of imazapyr will pose any substantial risk to humans or other species of animals. The EPA Office of Pesticides Program classifies imazapyr as practically non-toxic to mammals, birds, honeybees, fish, and aquatic invertebrates. This classification is clearly justified. None of the expected (non-accidental) exposures to these groups of animals raise substantial concern; indeed,

most accidental exposures raise only minimal concern. The major uncertainties regarding potential toxic effects in animals are associated with the lack of toxicity data on reptiles and amphibians.

Metsulfuron-methyl (Escort Formulation) (SERA 2005)

Aquatic algae do not appear to be as sensitive to metsulfuron-methyl. The highest hazard quotient observed for acute exposure is 0.03 associated with the upper range for the most sensitive species. For chronic exposures, the highest hazard quotient is 0.001 associated with the upper range for the most sensitive species. Therefore, it is not anticipated that adverse effects in aquatic algae would result from exposure to metsulfuron-methyl at standard application rates. The available data suggest that metsulfuron-methyl, like other herbicides, is much more toxic to aquatic plants than to aquatic animals. Just as there is little reason to doubt that adverse effects on some plant species are plausible, there is no clear basis for suggesting that effects on terrestrial or aquatic animals are likely or would be substantial (SERA 2005). There are also several acute assays on the honey bee that indicate that bees are no more sensitive than either mammals or birds to metsulfuron-methyl.

Picloram (SERA 2011c)

Based on expected concentrations of picloram in surface water, all central estimates of the HQs are below the level of concern for fish, aquatic invertebrates, and aquatic plants. No risk characterization for aquatic-phase amphibians can be developed because no directly useful data are available. Upper bound HQs exceed the level of concern for longer-term exposures in sensitive species of fish (HQ=3) and peak exposures in sensitive species of algae (HQ=8). It does not seem likely that either of these HQs would be associated with overt or readily observable effects in either fish or algal populations. In the event of an accidental spill, substantial mortality would be likely in both sensitive species of fish and sensitive species of algae. Risks to terrestrial animals are much less certain than risks to sensitive species of terrestrial plants. Exposures of terrestrial animals to contaminated water do not lead to apparent risks even in the case of an accidental spill. For contaminated vegetation or prey, none of the central estimates of exposure (i.e., the most likely events) result in HQs that exceed the level of concern (HQ=1). At the maximum anticipated application rate of 1 lb ae/acre, upper bound HQs that exceed the level of concern are associated with the consumption of contaminated grasses (i.e., food items which contain the highest concentrations of picloram) by a small mammal (HQ=3).

Protection Measure: Restricted to hand applications only (no broadcast applications) with a 25+-foot buffer and no use on sandy or riverwash soils.

Sethoxydim (SERA 2001)

In mammals, the major effects of sethoxydim as well as Poast (Brand name sethoxydim herbicide) appear to be related to neurologic effects and the major signs of toxicity in mammals include lacrimation, salivation, incontinence, ataxia, tremors, and convulsions.

Based on studies in mice, rats, and dogs, larger mammals appear to be more sensitive than smaller mammals. Because relatively few studies are available to support this apparent relationship, quantitative estimates of inter-species differences in sensitivity are not developed. Instead, the assumption is made that wildlife species may be as sensitive to sethoxydim as the most sensitive species on which data are available – i.e., the dog. Based on acute toxicity studies, sethoxydim and Poast appear to be about equally toxic to mammals. The EPA Office of Pesticides Program (1998) classified sethoxydim as practically non-toxic to birds and this assessment is supported by standard toxicity studies on sethoxydim in ducks and quail. Relatively little information is available of the toxicity of sethoxydim to terrestrial invertebrates. A standard acute toxicity study in bees indicates that direct applications of 10 µg sethoxydim/bee are not toxic and this value is used quantitatively in the risk assessment as a NOAE (No Observed Adverse Effect Level). There is a published study on effects in beetle larvae that suggests that Poast is relatively non-toxic at application rates higher than those planned by the Forest Service. Unlike the case with mammals, Poast is much more toxic to aquatic species than sethoxydim. Poast contains 74% petroleum solvent and only 18% sethoxydim. While somewhat speculative, it appears that the acute toxicity of Poast to aquatic species may be attributable almost exclusively to the solvent rather than to sethoxydim.

Because of the apparent low toxicity of sethoxydim to animals, the rather substantial variations in the exposure assessments have little impact on the assessment of risk to terrestrial animals. For birds, a chronic NOAEL of 10 mg/kg bw/day is used from a subchronic feeding study that assayed for both signs of systemic toxicity as well as reproductive capacity. The potential effects of acute exposures of birds are characterized using an acute NOAEL of 500 mg/kg/day. For terrestrial invertebrates, the dose-response assessment is based on a study in honey bees in which a dose of 107 mg/kg bw caused no apparent adverse effects. Sethoxydim is an herbicide that causes adverse effects in a variety of target and non-target plant species. In general, grasses are much more sensitive to sethoxydim than broad-leaved plants. Sethoxydim has a low order of acute toxicity to fish and aquatic invertebrates, with LC50 values of 1.2 and 2.6 mg/L, respectively. Aquatic macrophytes are much more sensitive to sethoxydim than fish or invertebrates. None of the hazard quotients for mammals or birds approach a level of concern, even at the upper limit of exposure. The weight of evidence suggests that no adverse effects in terrestrial animals are plausible using typical or even very conservative worst case exposure assumptions. For terrestrial plants, runoff may present a risk to some sensitive species. There is no indication that fish, aquatic invertebrates, or aquatic plants are likely to be exposed to concentrations of sethoxydim that will result in toxic effects, although the upper range of the hazard quotient for aquatic plants (i.e., 0.75) approaches a level of concern. A major limitation of this risk characterization for aquatic animals is the lack of any chronic toxicity studies on fish or aquatic invertebrates.

Protection Measure: A 50-foot no-application buffer is proposed for both spot spraying and hand application, and a 100-foot buffer for broadcast application.

Sulfometuron-methyl (SERA 2004b)

In standard experimental toxicity studies, sulfometuron-methyl has low acute and chronic oral toxicity. It seems reasonable to assume the most sensitive effects in wildlife mammalian species will be the same as those in experimental mammals (i.e., changes to blood and decreased body weight gain). Results of acute exposure studies in birds indicate that avian species appear no more sensitive than experimental mammals to the toxic effects of sulfometuron-methyl. Chronic exposure studies in birds were not identified in the available literature. Results of two acute exposure studies in honey bees indicate that bees are no more sensitive than either mammals or birds to sulfometuron-methyl. However, the available data are not sufficient to determine whether this apparent low level of toxicity can be generalized to other species of terrestrial invertebrates.

The available data suggest that sulfometuron-methyl is much more toxic to aquatic plants than to aquatic animals. The results of studies in fish suggest that frank toxic effects are not likely to be observed at concentrations less than or equal to 150 mg/L. Sulfometuron-methyl also appears to be relatively non-toxic to aquatic invertebrates, based on acute bioassays in daphnids, crayfish, and field-collected species of other aquatic invertebrates. The most sensitive aquatic species tested appears to be the African clawed frog. The effect of sulfometuron-methyl to amphibians was investigated in one study using African clawed frogs (SERA 2004b). Results of the study found that sulfometuron-methyl exposure can cause moderately severe malformations in these frogs, including miscoiling of the gut, incomplete eye lens formation, abnormal craniofacial development, and decreased tail resorption. The concentration that produced these effects depended upon the length of exposure, with shorter exposures showing no effect at higher concentrations than longer exposures. The author did not state whether data were reported in terms of mg of sulfometuron-methyl or mg of Oust. The FS/SERA risk assessment assumes that data refer to mg of Oust, to provide the most protection. The No Observed Adverse Effect Concentration (NOAEC) for malformations for 4-hour exposure is 0.38 mg active ingredient/liter (a.i./l), and that for 30-day exposure is 0.0075. However, exposure to 0.0075 mg a.i./L for 14 days was identified as the Lowest Observed Adverse Effect Concentration (LOAEC) for tail resorption rate effects. No mortality was observed at concentrations up to 7.5 mg a.i./L.

Triclopyr (SERA 2003b)

The salt formulation of triclopyr (TEA) is slightly toxic to fish and aquatic invertebrates. The LC50 of the salt formulation for rainbow trout is 552 mg/L and for bluegill sunfish is 891 mg/L. Triclopyr acid was found to be slightly toxic to birds and practically nontoxic to mammals, insects, freshwater fish and invertebrates. Triclopyr TEA was practically non-toxic to slightly toxic to birds and estuarine/marine invertebrates and practically non-toxic to freshwater fish, freshwater invertebrates, and estuarine/marine fish. Testing with Triclopyr butoxyethyl ester indicated it to be slightly toxic to birds, moderately toxic to

highly toxic to freshwater fish and estuarine/marine invertebrates, slightly to moderately toxic to freshwater invertebrates, and highly toxic to estuarine/marine fish.

Triclopyr butoxyethyl ester is much more toxic to aquatic species than triclopyr TEA or triclopyr acid. Triclopyr was specifically tested for ability to cause malformations in the frog embryo teratogenesis assay using African clawed frogs (*Xenopus laevis*) (Perkins 2000). Xenopus is a highly sensitive assay species for determining the teratogenicity of chemicals (Perkins 2000). No statistically significant increase in abnormalities were seen in any groups exposed to Garlon 3A or Garlon 4 at levels that were not also lethal to the embryos. Consistent with results for other aquatic species, Garlon 3A, containing triclopyr TEA, was 15 times less toxic than Garlon 4, containing triclopyr butoxyethyl ester (BEE). Garlon 4 reduced embryo growth at a concentration below the LC50. Perkins (2000) found that the 96-hour LC50 for Garlon 4 was 10 mg acid equivalent (ae)/L, and that for Garlon 3A was 159 mg ae/L. Perkins (2000) calculated that if Garlon 4 was applied at the highest application rate directly to water 15 cm deep (volume not specified), the expected environmental contamination was less than the LC50 and the LC5 by a factor of about 4 and 3, respectively.

While the assessments summarized above indicate that adverse effects to wildlife and plants are likely to occur from herbicide application, the following protection measures will be incorporated into all restoration projects that would be appended to this PBO:

- To minimize the use of herbicides and area of application:
    - As applicable, Best Management Practices for Wildland Stewardship: *Protecting Wildlife When Using Herbicides for Invasive Plant Management* (Cal-IPC 2015 or the most recent version) will be followed. If the guidance cannot be followed as applicable, then a project-specific Integrated Pest Management (IPM) Plan will be submitted with the ESA Section 7(a)(2) Review Form.
    - **VHDR-6**. Chemical control of invasive plants and animals will only be used when other methods are determined to be ineffective or would create greater environmental impacts than chemical control. Herbicide use will be evaluated on a project-by-project basis, with consideration of (and preference given toward) IPM strategies wherever possible. See University of California statewide IPM Program for guidance documents (http://ipm.ucanr.edu/index.html).
    - **VHDR-6**. Broadcast spraying, including the use of aerial drones, may be used if it provides greater application accuracy and access.
    - **VHDR-6**. Only the minimum area necessary for effective control will be treated.
    - **VHDR-6**. Whenever feasible, reduce vegetation biomass by mowing, cutting, or grubbing it before applying herbicide to reduce the amount of herbicide needed.
    - **VHDR-7**. The PCA monitoring prescription should address timing necessary to evaluate and report target species efficacy as well as any nontarget plant and animal effects. As applicable, *Best Management Practices for Wildland Stewardship: Protecting Wildlife When Using Herbicides for Invasive Plant Management* (Cal-IPC 2015 or the most recent version) will be followed. If the

guidance cannot be followed as applicable, then a project-specific IPM Plan will also be submitted with the ESA Section 7(a)(2) Review Form.
    - If herbicides, other than those listed in this PBO, are proposed for use by a Project Proponent, a complete effects analysis must be submitted along with the ESA Section 7(a)(2) Review Form to allow USFWS to determine if application of the herbicide(s) can be used.
    - **VHDR-7**. Field scouting must be done before application; the licensed Applicator (CEPA 2011) must be on site to lead all applications and will adhere to the PCA prescription and standard protection measures for application.
    - **VHDR-7**. Prior to field scouting or application, the PCA should receive Environmental Awareness Training (see GPM-4, Environmental Awareness Training) for the project so that they are aware of Covered Species and habitats present at the project site.
- To minimize overexposure by ensuring herbicides are applied correctly and according to label:
    - **VHDR-6**. Any chemical considered for control of invasive species must be approved for use in California; its application must adhere to all regulations, in accordance with the California Environmental Protection Agency (CEPA 2011 or most recent version); and it must be applied by a licensed applicator under all necessary state and local permits.
    - **VHDR-6**. Herbicides will be used only in a context where all treatments are considered, and various methods are used individually or in concert to maximize the benefits while reducing undesirable effects and applying the lowest legal effective application rate, unless site-specific analysis determines that a lower rate is needed to reduce nontarget impacts.
    - **VHDR-6**. Within 25 feet of any Water of the US, only formulations approved by the United States Environmental Protection Agency for aquatic use will be used. Soil-activated herbicides can be applied as long as directions on the label are followed.
    - **VHDR-7**. Herbicide Application Planning. Written chemical application, monitoring, and reporting prescriptions will be provided to each Project Proponent from a certified Pest Control Advisor (PCA) (CEPA 2011). The PCA will ensure that legal, appropriate, and effective chemicals are used, with appropriate methodologies.
    - **VHDR-8**, Herbicide Application Reporting. The licensed applicator will keep a record of all plants/areas treated; amounts and types of herbicide used; and dates of application as well as other monitoring elements prescribed by the PCA in VHDR-7; pesticide application reports must be completed within 24 hours of application and submitted to the applicable agencies for review. Wind and other weather data will be monitored and reported for all application reports.
- To reduce the risk of herbicide application on non-target species:

- **VHDR-6**. To limit the opportunity for surface water contamination with herbicide use, all projects will have a minimum buffer for ground-based broadcast application of 100 feet, and minimum buffer with a backpack sprayer of 15 feet, from all surface water.
- **VHDR-6**. The licensed Applicator will follow recommendations for all California restrictions, including wind speed, rainfall, temperature inversion, and ground moisture for each herbicide used. In addition, herbicides will not be applied when rain is forecast to occur within 24 hours, or during a rain event or other adverse weather conditions (e.g., snow, fog).
- **VHDR-6**. Herbicide adjuvants are limited to water or nontoxic or practically nontoxic vegetable oils and agriculturally registered, food grade colorants (e.g., Dynamark U.V. [red or blue], Aquamark blue, or Hi-Light blue) to be used to detect drift or other unintended exposure to waterways.
- **Herbicide specific measures**:
  - 2,4-D amine. This herbicide requires a 15-foot buffer from all surface water when hand-applied, and a 50-foot buffer when it is applied using a backpack sprayer.
  - Clethodim. No broadcast application allowed; only hand application and/or backpack sprayer, both with a 50-foot buffer from all surface water.
  - Clopyralid. This herbicide is allowed to be applied, one treatment per year/per site, up to the waterline (for hand application), but requires a 100-foot buffer from all surface water for broadcast application.
  - Dicamba. Broadcast application is not allowed for any project because of issues associated with drift. Other applications may be allowed through coordination with the USFWS during the ESA Section 7(a)(2) Review Form process.
  - Imazapic. This herbicide may be allowed up to the waterline with hand injection methods, but requires a 15-foot buffer from all surface water for backpack sprayer application, and 100-foot buffer for broadcast application.
  - Picloram. The use of this herbicide is restricted to hand applications only (no broadcast applications) with a 25+-foot buffer from all surface water and no use on sandy or riverwash soils.
  - Sethoxydim. This herbicide requires a 50- foot no-application buffer from all surface water for both spot spraying and hand application, and a 100-foot buffer from all surface water for broadcast application.

- To prevent and address spills:
  - **VHDR-6**. Any herbicides will be transported to and from the worksite in tightly sealed waterproof carrying containers. The licensed Applicator will carry a spill cleanup kit. Should a spill occur, people will be kept away from affected areas until clean-up is complete.

- **VHDR-6**. Herbicides will be mixed more than 150 feet, as practicable, from any surface water to minimize the risk of an accidental discharge. Impervious material will be placed beneath mixing areas in such a manner as to contain any spills associated with mixing/refilling.

Overall, adverse effects to covered plant and animal species is possible from herbicide treatment of non-native plants. However, the herbicide specific protection measures, general herbicide use protection measures, species-specific protection measures associated with herbicide use, and the administrative process are all designed to minimize adverse effects to Covered Species. The administrative process will occur through the ESA Section 7(a)(2) Review Form process. The Review From includes herbicide use information for the applicant to provide the necessary detail to ensure Covered Species impacts are minimized. In addition, all species- specific protection measures and Self-Imposed Take limits, still apply. Many of these limits include "no net loss" of function and value standards and limit adverse effects to those not significant to the population. As a result, any adverse effects to Covered Species that result from the use of herbicides to treat non-native plants are expected to be minimal because they are expected to be small in amount of habitat disturbed/volume released, and short term in duration regardless of control method or herbicide selected. Manual and chemical control treatments are designed to benefit the ecosystem by removing and controlling the spread of invasive plant species. The removal of invasive plant species can help restore native plant species thereby protecting, maintaining, and improving healthy vegetative communities. This would eventually result in improving the quality of habitat for native plant and wildlife species throughout California over the long-term.

In consideration of the effects identified for each herbicide and the general protection measures described above, a summary conclusion of effects from herbicide application is provided for each class of Covered Species. Please note that plants and vernal pool Branchiopoda have additional herbicide protection measures as described for those species' classes.

3.4.2. Effects to Species and Critical Habitat

3.4.2.1. Amphibians

3.4.2.1.1. General

Due to the habitat needs of amphibians, they will likely be adversely affected by all project types, if present in the action area. These project types include improvements to stream crossings and fish passage; removal of small dams, tide gates, flood gates, and legacy structures; bioengineered bank stabilization; restoration and enhancement of off-channel and side-channel habitat; creation, operation, and maintenance of water conservation projects, including off stream storage tanks and ponds and associated off-channel infrastructure; floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat; removal of pilings and other in-water structures; establishing, restoring, and enhancing tidal, subtidal, and

freshwater wetlands; and establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites.

While the proposed restoration projects will cause some adverse effects to covered amphibian species as identified in the general effects section above, these effects are expected to be short-term and localized, and thus relatively minor to the amphibian populations. Because many of the restoration actions will contribute to addressing reduced aquatic habitat complexity, degraded riparian conditions, and improve habitats above the degraded environmental baseline, (particularly at the site scale), we anticipate these proposed restoration projects will support the recovery of covered amphibian species in the long-term. Thus, while the proposed restoration activities will have site-specific effects, all proposed projects must result in a net increase in aquatic or riparian resource functions and/or services and be consistent with USFWS Recovery Plans or recovery-related documentation for Covered Species.

The general amphibian protection measures for permeable fencing (AMP-1), limitations during rain events (AMP-2), preconstruction surveys (AMP-3), disease prevention and decontamination (AMP-4), artificial light restrictions (AMP-5), minimizing consequences from clearing and grubbing vegetation (AMP-6), dewatering requirements/pump screens (AMP-7), removal of non-native invasive species (AMP-8), minimizing consequences from erosion control material (AMP-9), avoiding and minimizing impacts to amphibian species when encountered (AMP-10), and minimizing consequences from amphibian handling, capture and relocation (AMP-11) are intended to minimize the effects from restoration project implementation as described in the general effects section above. These protection measures are expected to greatly reduce the duration and extent of any adverse effects to individual amphibians or their habitats. In addition, the following is a prohibited activity under the this PBO: Projects overlapping the current range of amphibians endemic to the Sierra Nevada (i.e., Sierra Nevada yellow-legged frog, mountain yellow-legged frog (Northern California DPS, and Yosemite toad) that would extend the range of predatory fish (e.g., salmonids or centrarchids); because amphibians in the Sierra Nevada evolved mostly in the absence of predatory fish, the recovery of amphibians in the Sierra Nevada can be hindered by the presence of predatory fish.

While some restoration activities, and resulting exposures, are likely to result in injury or mortality for individuals (up to the self-imposed take limits provided in the project description), we expect few individual amphibians to be adversely affected per project. The eligibility requirements, prohibited actions, protection measures, and self-imposed take limits, combined, will minimize effects to covered amphibian species such that implementation of restoration actions are not expected to affect species abundance, productivity, distribution, or genetic diversity of any covered amphibian population within the Action Area. The USFWS expects that the number and productivity of any covered amphibian species will not be appreciably reduced or diminished across the ranges of each species. As the quality and quantity of habitat is improved, the long-term viability of local populations will likely be enhanced.

3.4.2.1.2. Herbicide Use

Very few laboratory studies have been conducted to assess the negative effects of herbicides on amphibians and even less on reptiles. However, many the few studies that have been conducted produce a cause for concern of application of herbicides where amphibians are present. Thus, it can be assumed that the toxicological effects of herbicides on amphibians and reptiles would include mortality and sublethal effects. According to the limited laboratory data that are available, sublethal effects may include behavioral alteration, slowed growth, developmental effects, and illness. It is assumed that sublethal effects could also include reduced reproductive success.

Application of herbicides will likely result in adverse health effects (mortality and sublethal effects) to all life stages of covered amphibian and reptile species. However, the general protection measures described above will ensure herbicides are only used when and where necessary, minimize over exposure by ensuring herbicides are applied correctly and according to label, and reduce the risk of herbicide application on non-target species.

3.4.2.1.3. Species-Specific Analyses

3.4.2.1.3.1. Arroyo toad and its critical habitat

Arroyo toad

As provided in more detail in Appendix C, arroyo toads are terrestrial for much of the year and can range widely into upland habitat for foraging and burrowing but use aquatic habitat for breeding. Breeding occurs in shallow, slow-moving stream systems and may occur from January to July (USFWS 1999b). Thirty-five populations of arroyo toad are distributed from Monterey County, California, in the United States south to Baja California, Mexico (USFWS 2015b). New data indicate that the species has continued to decline in numbers and in area occupied within its current range (USFWS 2015b). The recovery strategy for the arroyo toad consists of five parts, but the first is to stabilize and maintain populations throughout the range of the arroyo toad in California by protecting sufficient breeding and nonbreeding habitat (USFWS 1999b). This objective aligns well with the restoration projects for which this PBO is addressing. However, upland habitat restoration is not the focus of the restoration activities in this PBO. But as described in the general effects section, adjacent upland areas to aquatic and riparian habitat will likely experience adverse effects associated with a restoration project.

In addition to the General Protection Measures, Amphibian Protection Measures and prohibited activities, the Arroyo Toad Protection Measures provide specific requirements to minimize impacts to arroyo toads, especially during breeding season. These measures include requirements to conduct habitat assessment surveys by a Qualified Biologist to determine if protocol surveys are needed (ARTO-1) and timing restrictions for all project activities to occur outside the breeding season (March 15 – July 15); if the breeding season cannot be avoided there are additional measures to minimize impacts to arroyo toad via surveys by a USFWS-Approved

Biologist and limitations on heavy machinery when juvenile toads are present (ARTO-2). The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than 10 adults or juveniles annually; 5% of larval captures killed or injured annually; and 2 egg strands damaged or destroyed annually.

Given all the protection measures to minimize the number of arroyo toads adversely affected by the proposed action, especially the timing restrictions, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in more detail in Appendix C, arroyo toad critical habitat occurs in 21 units within Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego counties, California. The physical and biological features of designated critical habitat for the arroyo toad are: PCE-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; PCE-2) A natural flooding regime, or one sufficiently corresponding to natural; and PCE-3) 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.

While the proposed action will have adverse effects to arroyo toad critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following prohibited acts minimize impacts to arroyo toad critical habitat function: 1) Projects that would result in a net loss of aquatic resource functions and/or services); and 2) Restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.1.3.2. California red-legged frog and its critical habitat

California red-legged frog

As provided in more detail in Appendix C, the California red-legged frog is the largest native frog in the western United States and is widespread in the San Francisco Bay nine-county area, locally abundant within the California coastal counties from Mendocino County to Los Angeles County and presumed extirpated in Orange and San Diego counties. California red-legged frogs

are often prolific breeders, laying their eggs during or shortly after large rainfall events in late winter and early spring, between November through April (USFWS 2002). Aquatic habitat/breeding sites include pools and backwaters in streams and creeks, ponds, marshes, springs, sag ponds, dune ponds, and lagoons. Additionally, California red-legged frogs frequently breed in artificial impoundments such as stock ponds (USFWS 2002). Non-breeding aquatic and riparian habitat is essential for providing the space, food, and cover necessary to sustain the California red-legged frog. The total adult population size is unknown, but undoubtedly exceeds 10,000. The species is still locally abundant in portions of the San Francisco Bay Area and the central coast. Breeding sites in Marin County include several thousand adults (NatureServe 2015). The recovery strategy for the California red-legged frog includes restoring habitat conditions at or near historical localities, and where feasible, reestablish populations at extirpated localities (USFWS 2002). This objective aligns well with the restoration projects for which this PBO is addressing.

In addition to the General Protection Measures, Amphibian Protection Measures and prohibited activities, the California red-legged frog Protection Measures provide specific requirements to minimize impacts to California red-legged frogs, especially during breeding season. These measures include requirements to confine project activities in uplands to May 1 through October 31 and project activities in aquatic breeding habitat to July 1 through October 31 (CFLF-CTS-1). Potential variances and additional details are provided in the project description of this PBO. Procedures to minimize impacts to California red-legged frogs during electrofishing activities are also provided (CRLF-CTS-2). The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than 60 terrestrial adults or juveniles outside of the Sierra Nevada (shared between Field Offices), 5 terrestrial adults or juveniles for locations within the Sierra Nevada; and 5% of larval captures annually.

Given all the protection measures to minimize the number of California red-legged frogs adversely affected by the proposed action, especially the timing restrictions, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, California red-legged frog critical habitat occurs in Alameda, Butte, Calaveras, Contra Costa, El Dorado, Kern, Kings, Los Angeles, Marin, Mendocino, Merced, Monterey, Napa, Nevada, Placer, Riverside, San Benito, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Ventura, and Yuba Counties, California. Within these areas, the primary constituent elements for the California red-legged frog consist of four components: PCE-1) Aquatic Breeding Habitat: Standing bodies of fresh water (with salinities less than 4.5 ppt); PCE-2) Aquatic Non-Breeding Habitat: Freshwater pond and stream habitats that may not hold water long enough for the species to complete its aquatic life cycle but which provide for shelter, foraging, predator avoidance, and aquatic

dispersal of juvenile and adult California red-legged frogs; PCE-3) Upland areas adjacent to or surrounding breeding and non-breeding aquatic and riparian habitat up to a distance of 1 mi (1.6 km) in most cases (i.e., depending on surrounding landscape and dispersal barriers) including various vegetational series such as grassland, woodland, forest, wetland, or riparian areas that provide shelter, forage, and predator avoidance for the California red-legged frog; PCE-4) Dispersal Habitat: Accessible upland or riparian habitat within and between occupied locations within a minimum of 1 mi (1.6 km) of each other and that support movement between such sites.

While the proposed action will have adverse effects to California red-legged frog critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following prohibited acts minimize impacts to California red-legged frog critical habitat function: 1) Projects that would result in a net loss of aquatic resource functions and/or services); and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.1.3.3. California tiger salamander – Central California DPS and its critical habitat

California tiger salamander – Central California DPS

As provided in more detail in Appendix C, the California tiger salamander – Central California DPS occurs in the Bay Area, Central Valley, southern San Joaquin Valley, and the Central Coast Range of California (USFWS 2014a). California tiger salamanders spend a majority of their lives in upland habitats consisting of grassland savannah and scrub or chaparral habitats. Most evidence suggests that California tiger salamanders remain active in their underground dwellings during the summer months, making frequent underground movements in burrow systems of less than 33 ft. (10 m), but otherwise remaining underground until the onset of rain and the winter months (USFWS 2014a). Upland habitat restoration is not the focus of the restoration activities in this PBO. But as described in the general effects section, adjacent upland areas to aquatic and riparian habitat will likely experience adverse effects associated with a restoration project.

In addition to the General Protection Measures, Amphibian Protection Measures and prohibited activities, the California tiger salamander – Central California DPS Protection Measures provide specific requirements to minimize impacts to California tiger salamander - Central California DPS individuals, especially during breeding season. These measures include requirements to confine project activities in uplands to May 1 through October 31 and project activities in aquatic breeding habitat to July 1 through October 31 (CFLF-CTS-1). Potential variances and additional

details are provided in the project description of this PBO. Procedures to minimize impacts to during electrofishing activities are also provided (CRLF-CTS-2). The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than 20 adults or juveniles (no more than 10 per Field Office) annually and no more than 5% of larval captures injured or killed annually.

Given all the protection measures to minimize the number of California tiger salamander – Central California DPS individuals adversely affected by the proposed action, especially the timing restrictions, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, California tiger salamander – Central California DPS critical habitat occurs in four regions: 1) The Central Valley Region; 2) the Southern San Joaquin Valley Region; 3) the East Bay Region (including Santa Clara Valley area); and 4) the Central Coast Region. The primary constituent elements for the California tiger salamander - Central California DPS consist of four components: PCE-1) Standing bodies of fresh water, including natural and man-made (e.g., stock) ponds, vernal pools, and other ephemeral or permanent water; PCE-2) Upland habitats adjacent and accessible to breeding ponds that contain small mammal burrows; and PCE-3) Accessible upland areas between breeding locations (PCE-1) and areas with small mammal burrows (PCE-2) that allow for movement (USFWS 2005a).

While the proposed action will have adverse effects to California tiger salamander – Central California DPS critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following prohibited acts minimize impacts to California tiger salamander – Central California DPS critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; 2) Projects that would result in a net loss of aquatic resource functions and/or services); and 3) Restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.1.3.4. California tiger salamander – Santa Barbara County DPS and its critical habitat

California tiger salamander – Santa Barbara County DPS

As provided in more detail in Appendix C, the California tiger salamander – Santa Barbara County DPS occurs in Santa Barbara County, California. California tiger salamanders spend a majority of their lives in upland habitats consisting of grassland savannah and scrub or chaparral habitats. They spend the summer and fall months in small mammal burrows. The Santa Barbara County DPS of 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 (USFWS 2009).

In addition to the General Protection Measures, Amphibian Protection Measures and prohibited activities, the California tiger salamander – Santa Barbara County DPS Protection Measures provide specific requirements to minimize impacts to California tiger salamander – Santa Barbara County DPS individuals, especially during breeding season. These measures include requirements to confine project activities in uplands to May 1 through October 31 and project activities in aquatic breeding habitat to July 1 through October 31 (CFLF-CTS-1). Potential variances and additional details are provided in the project description of this PBO. Procedures to minimize impacts to during electrofishing activities are also provided (CRLF-CTS-2). The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than 5 adults or juveniles annually and no more than 5% of larval captures per pond annually.

Given all the protection measures to minimize the number of California tiger salamander – Santa Barbara County DPS individuals adversely affected by the proposed action, especially the timing restrictions, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in more detail in Appendix C, California tiger salamander – Santa Barbara County DPS critical habitat occurs in Santa Barbara County, California. The primary constituent elements for the California tiger salamander – Santa Barbara County DPS consist of four components: PCE-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; PCE-2) Barrier-free uplands adjacent to breeding ponds that contain small mammal burrows; and PCE-3) Upland areas between breeding locations (PCE 1) and areas with small mammal burrows (PCE 2) that allow for dispersal (USFWS 2004).

While the proposed action will have adverse effects to California tiger salamander – Santa Barbara County DPS critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following prohibited acts minimize impacts to California tiger salamander – Santa Barbara County DPS critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; 2) Projects that would result in a net loss of aquatic resource functions and/or services); and 3) Restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.1.3.5. Foothill yellow-legged frog (all 4 DPS)

As indicated earlier, there are four DPSs proposed for listing for the foothill yellow-legged frog. Before discussing the unique features of the four DPSs, the following information is consistent among all DPS. Foothill yellow-legged frogs are stream-obligates. Stream habitat for the species is highly variable and keyed on flow regimes. Habitat within the stream includes rocky substrate mostly free of sediments with interstitial spaces to allow for predator avoidance. It is widely observed that adult foothill yellow-legged frogs travel to and from breeding areas each year. During the breeding season, foothill yellow-legged frogs exhibit different movement strategies with some individuals moving very little ("sedentary" individuals that appear to establish home ranges or defend territories) and others moving greater distances without appearing to establish home ranges ("mobile" individuals) (USFWS 2021b). The Species Status Assessment for foothill yellow-legged frog identifies the need for habitat restoration (USFWS 2021b). This aligns well with the restoration projects for which this PBO is addressing.

Foothill yellow-legged frog – Central Coast DPS

As provided in Appendix C, the foothill yellow-legged frog – Central Coast DPS extends south from the San Francisco Bay through the Diablo Range and through the coast range (Santa Cruz Mountains and Gabilan Mountains) east of the Salinas Valley. While the streams and rivers in the South Coast unit are different from those in most other parts of the foothill yellow-legged frog range, they share similarities to many waterways in the Central Coast unit. Waterways in the South Coast and Central Coast units tend to have flashier flows, more ephemeral channels, and a higher degree of intermittency because of the region's more variable, and lower amount of, precipitation (USFWS 2021b). The Central Coast DPS has the most presumed occupied stream segments among the four DPS proposed for listing, but still significantly less than the remaining 3 analysis units range-wide of the foothill yellow-legged frog (USFWS 2021b).

Foothill yellow-legged frog – North Feather DPS

As provided in Appendix C, the Foothill yellow-legged frog – North Feather DPS is located primarily in Plumas and Butte counties. This DPS occupies the transition zone between the northern Sierra Nevada, Southern Cascades Foothills, and Tuscan Flows ecoregions. The North Feather DPS is the smallest unit and differs from the surrounding watersheds in terms of geology and aspect and is the only known area where the foothill yellow-legged frog and Sierra Nevada yellow-legged frog currently coexist (USFWS 2021b). The North Feather DPS has the second lowest presumed occupied stream segments within the 7 analysis units throughout the range of the foothill yellow-legged frog four DPSs proposed for listing, but still significantly more than the South Coast DPS (USFWS 2021b).

Foothill yellow-legged frog – South Coast DPS

As provided in Appendix C, the Foothill yellow-legged frog – South Coast DPS extends along the coastal Santa Lucia Range and the Sierra Madre Mountains. While the streams and rivers in the South Coast unit are different from those in most other parts of the foothill yellow-legged frog range, they share similarities to many waterways in the Central Coast unit. Waterways in the South Coast and Central Coast units tend to have flashier flows, more ephemeral channels, and a higher degree of intermittency because of the region's more variable, and lower amount of, precipitation (USFWS 2021b). The South Coast DPS has significantly less presumed occupied stream segments within the 7 analysis units throughout the range of the foothill yellow-legged frog (USFWS 2021b).

Foothill yellow-legged frog – Southern Sierra DPS

As provided in Appendix C, the Foothill yellow-legged frog – Southern Sierra DPS extends from the South Fork American River sub-basin to the transition zone between the Sierra Nevada and the Tehachapi Mountains that border the south end of the California Central Valley. The Southern Sierra DPS has the second highest number of presumed occupied stream segments among the four DPSs proposed for listing, but it is similar in total to the Central Coast DPS (USFWS 2021b).

In addition to the General Protection Measures, Amphibian Protection Measures and prohibited activities, the Foothill yellow-legged frog Protection Measures provide specific requirements to minimize impacts to all four DPS of the Foothill yellow-legged frog, especially during breeding season. These measures include confining project activities in upland areas to August 1 through October 31 and occupied aquatic breeding habitat to May 1 through November 15, along with capture and relocation and dewatering minimization measures (more details and a variance process is provided in SNYLF-MYLF-FYLF-1); water temperature requirements (SNYLF-MYLF-FYLF-2); and borrow site measures to minimize sediment transport (SNYLF-MYLF-FYLF-3). The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than 20 adults or juveniles annually (no more than 10 per Field Office annually) and no more than 5% of larval captures annually. In addition, individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area.

Given the limited number of occupied foothill yellow-legged frog stream segments, all the protection measures to minimize the number of foothill yellow-legged frogs adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and Covered Species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.1.3.6. Mountain yellow-legged frog – Northern California DPS and its critical habitat

Mountain yellow-legged frog – Northern California DPS

As provided in more detail in Appendix C, the mountain yellow-legged frog – Northern California DPS occupies the western Sierra Nevada north of the Monarch Divide (in Fresno County) and the eastern Sierra Nevada (east of the crest) in Inyo and Mono Counties. Their distribution is currently restricted primarily to publicly-managed lands at high elevations, including streams, lakes, ponds, and meadow wetlands in National Forests and National Parks. Most populations are isolated in the headwaters of streams or tributaries due to the extensive distribution of predatory nonnative trout in historical habitat; thus, it exists in a highly fragmented environment (USFWS 2018). Mountain yellow-legged frog – Northern California DPSs are highly aquatic and generally not found more than 1 m (3.3 ft.) from water. They have a multi-year larval development stage and are present in aquatic breeding habitat year-round. Both adult and tadpole Mountain yellow-legged frog – Northern California DPSs overwinter for up to 9 months in the bottoms of lakes (USFWS 2014b). Habitat restoration is one of the recommendations in the Mountain yellow-legged frog – Northern California DPS Recovery Plan (USFWS 2018). This aligns well with the restoration projects for which this PBO is addressing.

In addition to the General Protection Measures, Amphibian Protection Measures and prohibited activities, the Mountain yellow-legged frog – Northern California DPS Protection Measures provide specific requirements to minimize impacts to Mountain yellow-legged frog – Northern California DPSs, especially during breeding season. These measures include confining project activities in upland areas to August 1 through October 31 and occupied aquatic breeding habitat to May 1 through November 15, along with capture and relocation and dewatering minimization measures (more details and a variance process is provided in SNYLF-MYLF-FYLF-1); water temperature requirements (SNYLF-MYLF-FYLF-2); and borrow site measures to minimize sediment transport (SNYLF-MYLF-FYLF-3). The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than 20 adults or juveniles annually (no more than 10 per Field Office annually) and no more than 5% of larval captures annually. In addition, individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area. Lastly, the following prohibited act minimizes adverse effects to Mountain yellow-legged frog – Northern California DPS from predatory fish: Projects overlapping the current range of amphibians endemic to the Sierra Nevada (i.e., Sierra Nevada yellow legged frog, mountain yellow-legged frog (Northern California DPS), and Yosemite toad) that would extend the range of predatory fish (e.g.,

salmonids or centrarchids); because amphibians in the Sierra Nevada evolved mostly in the absence of predatory fish, the recovery of amphibians in the Sierra Nevada can be hindered by the presence of predatory fish.

Given all the protection measures to minimize the number of Mountain yellow-legged frog – Northern California DPS individuals adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in more detail in Appendix C, Mountain yellow-legged frog – Northern California DPS critical habitat occurs in Fresno, Inyo and Tulare Counties, California. The Primary Constituent Elements of designated critical habitat for the Mountain yellow-legged frog – Northern California DPS consist of three components: PCE-1) Aquatic habitat for breeding and rearing, consisting of permanent water bodies, or those that are either hydrologically connected with, or close to, permanent water bodies, including, but not limited to, lakes, streams, rivers, tarns, perennial, pools, and other forms of aquatic habitat; PCE-2) Aquatic nonbreeding habitat (including overwintering habitat), which may contain the same characteristics as aquatic breeding and rearing habitat; and PCE-3) Upland areas adjacent to or surrounding breeding and nonbreeding aquatic habitat that provide area for feeding and movement by Mountain yellow-legged frog – Northern California DPSs (USFWS 2016).

While the proposed action will have adverse effects to Mountain yellow-legged frog – Northern California DPS critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following prohibited acts minimize impacts to Mountain yellow-legged frog – Northern California DPS critical habitat function: 1) Projects that would result in a net loss of aquatic resource functions and/or services), and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.1.3.7. Santa Cruz long-toed salamander

As provided in more detail in Appendix C, the Santa Cruz long-toed salamander occurs in Santa Cruz County and Monterey County, California. The Santa Cruz long-toed salamander inhabits freshwater wetlands for breeding and adjacent upland scrub and woodland areas during the non-

breeding season. Creation of additional breeding ponds is among the recommendations in the Santa Cruz long-toed salamander Recovery Plan (USFWS 2004). This aligns well with the restoration projects for which this PBO is addressing. Although Santa Cruz long-toed salamanders spend most of their lives underground in burrows of small mammals, under leaf litter, rotten logs, fallen branches, and among the root systems of trees (USFWS 2004) and upland habitat restoration is not the focus of the restoration activities in this PBO, adjacent upland areas to aquatic and riparian habitat will likely experience adverse effects associated with a restoration project, as described in the general effects section.

In addition to the General Protection Measures, Amphibian Protection Measures and prohibited activities, the Santa Cruz long-toed salamander Protection Measures provide specific requirements to minimize impacts to Santa Cruz long-toed salamander individuals, especially during breeding season. These measures include requirements for projects requiring ground disturbance in known or potentially occupied suitable habitat for Santa Cruz long-toed salamander to provide detailed information and receive approval from USFWS (SCLTS-1) and to confine project activities in uplands to April 15 through October 31 and for project activities in aquatic breeding habitat to when the breeding habitat is dry (SLCTS-2). Potential variances and additional details are provided in the project description of this PBO. The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than 5 adults or juveniles annually and no more than 5% of larval captures injured or killed annually.

Given all the protection measures to minimize the number of Santa Cruz long-toed salamander adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.1.3.8. Sierra Nevada yellow-legged frog and its critical habitat

Sierra Nevada yellow-legged frog

As provided in more detail in Appendix C, Sierra Nevada yellow-legged frogs occupy the western Sierra Nevada north of the Monarch Divide (in Fresno County) and the eastern Sierra Nevada (east of the crest) in Inyo and Mono Counties. Their distribution is currently restricted primarily to publicly managed lands at high elevations, including streams, lakes, ponds, and meadow wetlands in National Forests and National Parks. Extensive surveys between 1995 and 2005 yielded only 11 occupied sites, and population size estimates range from 1,000 to 10,000 individuals (NatureServe 2015). Sierra Nevada yellow-legged frogs are highly aquatic and generally not found more than 1 m (3.3 ft.) from water. They have a multi-year larval development stage and are present in aquatic breeding habitat year-round. Both adult and tadpole Sierra Nevada yellow-legged frogs overwinter for up to 9 months in the bottoms of lakes (USFWS 2014b).

In addition to the General Protection Measures, Amphibian Protection Measures and prohibited activities, the Sierra Nevada yellow-legged frog Protection Measures provide specific

requirements to minimize impacts to Sierra Nevada yellow-legged frogs, especially during breeding season. These measures include confining project activities in upland areas to August 1 through October 31 and occupied aquatic breeding habitat to May 1 through November 15, along with capture and relocation and dewatering minimization measures (more details and a variance process is provided in SNYLF-MYLF-FYLF-1); water temperature requirements (SNYLF-MYLF-FYLF-2); and borrow site measures to minimize sediment transport (SNYLF-MYLF-FYLF-3). The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than 20 adults or juveniles annually (no more than 10 per Field Office annually) and no more than 5% of larval captures annually. In addition, individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area. Lastly, the following prohibited act minimizes adverse effects to Sierra Nevada yellow-legged frog from predatory fish: Projects overlapping the current range of amphibians endemic to the Sierra Nevada (i.e., Sierra Nevada yellow legged frog, mountain yellow-legged frog (Northern California DPS), and Yosemite toad) that would extend the range of predatory fish (e.g., salmonids or centrarchids); because amphibians in the Sierra Nevada evolved mostly in the absence of predatory fish, the recovery of amphibians in the Sierra Nevada can be hindered by the presence of predatory fish.

Given all the protection measures to minimize the number of Sierra Nevada yellow-legged frogs adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in more detail in Appendix C, Sierra Nevada yellow-legged frog critical habitat occurs in Lassen, Plumas, Sierra, Nevada, Placer, El Dorado, Amador, Alpine, Calaveras, Tuolumne, Mono, Mariposa, Madera, Fresno, and Inyo Counties, California. The Primary Constituent Elements of designated critical habitat for the Sierra Nevada yellow-legged frog consist of three components: PCE-1) Aquatic habitat for breeding and rearing, consisting of permanent water bodies, or those that are either hydrologically connected with, or close to, permanent water bodies, including, but not limited to, lakes, streams, rivers, tarns, perennial, pools, and other forms of aquatic habitat; PCE-2) Aquatic nonbreeding habitat (including overwintering habitat), which may contain the same characteristics as aquatic breeding and rearing habitat; and PCE-3) Upland areas adjacent to or surrounding breeding and nonbreeding aquatic habitat that provide area for feeding and movement by Sierra Nevada yellow-legged frogs (USFWS 2016).

While the proposed action will have adverse effects to Sierra Nevada yellow-legged frog critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some

habitat functions, the following prohibited acts minimize impacts to Sierra Nevada yellow-legged frog critical habitat function: 1) Projects that would result in a net loss of aquatic resource functions and/or services; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.1.3.9. Yosemite toad and its critical habitat

Yosemite toad

As provided in more detail in Appendix C, Yosemite toads occur in scattered locations the Sierra Nevada Mountain Range of California. Yosemite toads are found in moist environments that include meadows, edges of forest, grasslands, and shallow pools of water, and are often in sunny spots. Adults burrow in soil, leaf litter, and underground rodent burrows from October through April or May. Yosemite toads emerge from their burrows after the snow has melted. Breeding is limited to still or slow-moving waters, along shallow edges of pools. Adult Yosemite toads use moist meadows and terrestrial upland habitats for foraging; they burrow in soil, debris, or rodent burrows (USFWS 2014b). Since Yosemite toads spend part of their life cycle in upland areas, it is worth noting that upland habitat restoration is not the focus of the restoration activities in this PBO. But as described in the general effects section, adjacent upland areas to aquatic and riparian habitat will likely experience adverse effects associated with a restoration project.

In addition to the General Protection Measures, Amphibian Protection Measures and prohibited activities, the Yosemite Toad Protection Measures provide specific requirements to minimize impacts to Yosemite toads, especially during breeding season. These measures include timing restrictions for all project activities to occur once breeding sites are dry (typically between July 15 and September 15) and end prior to October 1 to allow overwintering migrations and protection of overwintering Yosemite toads (variances are allowed via the specifics provided in YOTO-1); water temperature requirements (YOTO-2); borrow site measures to minimize sediment transport (YOTO-3); measures to avoid lupine areas with rodent burrows (YOTO-4); debris management to minimize impacts to suitable upland habitat, cover, and dispersal (YOTO-5); and burning pile measures to minimize impacts to terrestrial habitats and spring dispersal of adult toads (YOTO-6). The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than 20 adults or juveniles annually (no more than 10 per Field Office annually) and no more than 5% of larval captures annually. In addition, individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area. Lastly, the following prohibited act minimizes adverse effects to Yosemite toad from predatory fish: Projects overlapping the current range of amphibians endemic to the Sierra Nevada (i.e., Sierra Nevada yellow legged frog, mountain yellow-legged frog (Northern California DPS), and Yosemite toad) that would extend the range of predatory fish (e.g., salmonids or centrarchids); because amphibians in the Sierra Nevada evolved mostly

in the absence of predatory fish, the recovery of amphibians in the Sierra Nevada can be hindered by the presence of predatory fish.

Given all the protection measures to minimize the number of Yosemite toads adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in more detail in Appendix C, Yosemite toad critical habitat occurs in Alpine, Tuolumne, Mono, Mariposa, Madera, Fresno, and Inyo Counties, California. The physical and biological features of designated critical habitat for the Yosemite toad consist of two components: PCE-1): Aquatic breeding habitat consisting of fresh water, including wet meadows, slow-moving streams, shallow ponds, spring systems, and shallow areas of lakes; and PCE-2) Upland areas adjacent to or surrounding breeding habitat up to a distance of 1.25 kilometers (0.78 miles) in most cases including seeps, springheads, talus and boulders (USFWS 2016).

While the proposed action will have adverse effects to Yosemite toad critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, protection measures, and self-imposed take limits. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following prohibited acts minimize impacts to Yosemite toad critical habitat function: 1) Projects that would result in a net loss of aquatic resource functions and/or services; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.2. Reptiles

3.4.2.2.1. General

While the proposed restoration projects will cause some adverse effects to covered reptile species as identified in the general effects section above, these effects are expected to be short-term and localized, and thus relatively minor to the reptile populations. Because many of the restoration actions will contribute to addressing reduced aquatic habitat complexity, degraded riparian conditions, and improve habitats above the degraded environmental baseline, (particularly at the site scale), we anticipate these projects will support the recovery of covered reptile species in the long-term. Thus, while the proposed restoration activities will have site-

specific effects, all proposed projects must result in a net increase in aquatic or riparian resource functions and/or services and be consistent with USFWS Recovery Plans or recovery-related documentation for Covered Species.

The general reptile protection measures for preconstruction surveys (REP-1), wildlife exclusion fencing measures (REP-2), minimizing consequences from clearing and grubbing vegetation (REP-3), prohibitions on rodenticides (REP-4), avoiding and minimizing impacts to reptile species when encountered (REP-5), and minimizing consequences from reptile handling, capture and relocation (REP-6) are intended to minimize the effects from restoration project implementation as described in the general effects section above. These protection measures are expected to greatly reduce the duration and extent of any adverse effects to individual reptiles or their habitats.

While some restoration activities, and resulting exposures, are likely to result in injury or mortality for individuals (up to the self-imposed take limits provided in the project description), we expect few individual reptiles to be adversely affected per project. The eligibility requirements, prohibited actions, protection measures, and self-imposed take limits, combined, will minimize effects to covered reptile species such that implementation of restoration actions are not expected to affect species abundance, productivity, distribution, or genetic diversity of any covered reptile population within the Action Area. The USFWS expects that the number and productivity of any covered reptile species will not be appreciably reduced or diminished across the ranges of each species. As the quality and quantity of habitat is improved, the long-term viability of local populations will likely be enhanced.

3.4.2.2.2. Herbicide Use

Very few laboratory studies have been conducted to assess the negative effects of herbicides on amphibians and even less on reptiles. However, many of the few studies that have been conducted produce a cause for concern of application of herbicides where amphibians are present. Thus, it can be assumed that the toxicological effects of herbicides on amphibians and reptiles would include mortality and sublethal effects. According to the limited laboratory data that are available, sublethal effects may include behavioral alteration, slowed growth, developmental effects, and illness. It is assumed that sublethal effects could also include reduced reproductive success.

Application of herbicides will likely result in adverse health effects (mortality and sublethal effects) to all life stages of covered amphibian and reptile species. However, the general protection measures described above will ensure herbicides are only used when and where necessary, minimize over exposure by ensuring herbicides are applied correctly and according to label, and reduce the risk of herbicide application on non-target species.

3.4.2.2.3. Species-Specific Analyses

3.4.2.2.3.1. Alameda whipsnake and its critical habitat

Alameda whipsnake

As provided in more detail in Appendix C, Alameda whipsnakes only occur in the inner coast ranges of Contra Costa County and Alameda County, California. They are known to retreat to winter hibernaculum in November and emerge in March. Mating season is from late-March to mid-June and hatchlings have been observed above ground from August through November (USFWS 2011b). They are an active daytime predator and rock outcrops are an important feature of their habitat; essential for breeding, reproduction, and foraging (USFWS 2011b). Upland habitat restoration is not the focus of the restoration activities in this PBO, but adjacent upland areas to aquatic and riparian habitat will likely experience adverse effects associated with a restoration project. Thus, the Alameda whipsnake is most likely to be affected by techniques used for establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

In addition to the General Protection Measures and Reptile Protection Measures, the Alameda whipsnake Protection Measures provide specific requirements to minimize impacts from ground disturbance and vegetation clearing by confining work to April 1 through October 31 when the snakes are more active, capable of escape, more likely to avoid danger, and less likely to be affected by the restoration activities, avoid all rock outcrops (AWS-1) to avoid impacting this important habitat feature. Extended or alternative work windows may be considered on an individual project basis with prior approval from the USFWS Field Office, provided the Project Proponent can demonstrate that measures implemented to avoid or minimize exposure would do so at a level commensurate with the standard work windows. The work is also required to occur only during daytime hours (AWS-2) to ensure snakes are active and visible. If nighttime work is needed, the Project Proponent will need approval by the USFWS Field Office. A Qualified Biologist will be required to inspect the site prior to vehicle operation and to monitor construction activities. The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than four adults or juveniles/hatchlings annually. It also requires no net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.

Given all the protection measures to minimize the number of Alameda whipsnake adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in more detail in Appendix C, Alameda whipsnake critical habitat occurs in additional counties from where Alameda whipsnakes have been observed in San Joaquin and Santa Clara Counties, California. The Primary Constituent Elements include PCE-1) scrub/shrub communities with a mosaic of open and closed canopy; PCE-2) woodland or annual grassland plant communities contiguous to lands identified in PCE-1; and PCE-3) lands containing rock outcrops, talus and small burrows. Most restoration projects that would use this PBO are predominantly aquatic and as such projects with activities in Alameda whipsnake critical habitat is expected to be uncommon.

While the proposed action will have adverse effects to Alameda whipsnake critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, protection measures, and self-imposed take limits. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following minimizes impacts to Alameda whipsnake habitat and critical habitat function: 1) Ground disturbance and vegetation clearing in scrub/chaparral habitat will be avoided to the maximum extent possible; 2) to the extent practicable, all rock outcrops will be avoided; 3) no net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement; and 4) the following prohibited act: Restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.2.3.2. Giant garter snake

As of 2017, giant garter snakes are only known to occur in nine populations in the Sacramento and San Joaquin Valleys of California. Giant garter snakes appear to be most numerous in rice-growing regions (see Appendix C). The diverse habitat elements of rice-lands contribute structure and complexity to this man-made ecosystem (USFWS 2017b). Although the short-term population-level trend of this species is a decline of 10 to 30%, the long-term population-level trend is a decline of 30 to 50% (NatureServe 2022; USFWS 2012a). Giant garter snakes are most likely to be affected by techniques used for floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat; establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands; and establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed site. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

One of the objectives of the giant garter snake recovery plan is to restore and conserve healthy Central Valley wetland ecosystems that function to support the giant garter snake and associated

species and communities of conservation concern such as Central Valley waterfowl and shorebird populations (USFWS 2017c). This objective aligns well with the restoration projects for which this PBO is addressing.

In addition to the General Protection Measures and Reptile Protection Measures, the giant garter snake Protection Measures provides specific requirements to minimize impacts from restoration projects by requiring a USFWS-Approved Biologist to oversee construction activities (GGS-1), minimization of the project footprint in suitable habitat (GGS-2), work is confined to May 1 through October 1 (GGS-3) when the snakes are more active, capable of escape, more likely to avoid danger, and less likely to be affected by the restoration activities, measures to reduce vehicle mortality (GGS-4), vegetation clearing confined to the minimal area necessary within 200 feet of suitable habitat (GGS-5), a combination of fencing and/or monitoring to minimize impacts to giant garter snake (GGS-6), measures to minimize impacts during clearing and prevent underground refugia that giant garter snakes can use during the snake active period of May 1 through October 1 (GGS-7), requirement for surveys if work stops for two weeks or more (GGS-9), dewatering minimization measures (GGS-10), and minimization requirements if a giant garter snake is observed in the construction area (GGS-11).The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than four adults or juveniles/hatchlings annually. It also requires no net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.

Given all the protection measures to minimize the number of giant garter snake adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.2.3.3. San Francisco garter snake

As provided in more detail in Appendix C, the San Francisco garter snake is endemic to the San Francisco Peninsula and is known only from San Mateo County, California. Prey items are usually captured in wetlands, either in emergent vegetation or in areas of shallow open water (Stanford University 2013; USFWS 2006). Necessary habitat for San Francisco garter snakes includes densely-vegetated standing freshwater habitats with some open water areas, open grassy uplands and shallow marshlands for breeding, and rodent burrows for hibernacula (shelters where they spend dormant winter months) and refugia (USFWS 2006). San Francisco garter snakes also require open grassy uplands and shallow marshlands with adequate emergent vegetation for breeding (USFWS 2006). Overall, the species has experienced a short-term decline of 10 to 30% (NatureServe 2015). San Francisco garter snakes are most likely to be affected by techniques used for floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat; establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands; and establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed site. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

One of the snake's Recovery Plan goals is to continue ongoing habitat restoration and enhancement for wild populations (USFWS 2006). This objective aligns well with the restoration projects for which this PBO is addressing.

In addition to the General Protection Measures and Reptile Protection Measures, the San Francisco garter snake Protection Measures provide specific requirements to minimize impacts from restoration projects by requiring measures to reduce vehicle mortality (SFGS-1), confining work in suitable habitat to April 15 through October 31 (SFGS-2) and restricting work to daytime hours (SFGS-3) when the snakes are more active, capable of escape, more likely to avoid danger, and less likely to be affected by the restoration activities, requiring a Qualified Biologist to be present when working in or near San Francisco garter snake habitat; and management of brush piles to avoid snakes from using the brush piles (SFGS-5). The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than four adults or juveniles/hatchlings annually. It also requires no permanent loss of hibernacula.

Given all the protection measures to minimize the number of San Francisco garter snakes adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.3. Birds

3.4.2.3.1. General

While the proposed restoration projects will cause some adverse effects to covered bird species as identified in the general effects section above, these effects are expected to be short-term and localized, and thus relatively minor to the bird populations. Because many of the restoration actions will contribute to addressing reduced aquatic habitat complexity, degraded riparian conditions, and improve habitats above the degraded environmental baseline, (particularly at the site scale), we anticipate these projects will support the recovery of covered bird species in the long-term. Thus, while the proposed restoration activities will have site-specific effects, all proposed projects must result in a net increase in aquatic or riparian resource functions and/or services and be consistent with USFWS Recovery Plans or recovery-related documentation for Covered Species.

Most of the eight species of birds covered in this PBO have very different biological needs. For example, western snowy plovers rely on sandy beach/dune habitat while northern spotted owls rely on established forests. As such, no general bird protection measures were established in the PBA. However, each of the covered bird species has species-specific protection measures, as described in the project description of this PBO, to minimize the effects from restoration project implementation as described in the general effects section above. These protection measures are

expected to greatly reduce the duration and extent of any adverse effects to individual birds or their habitats.

While some restoration activities, and resulting exposures, are likely to result in injury or mortality for individuals (up to the self-imposed take limits provided in the project description), we expect few individual birds to be adversely affected per project. The eligibility requirements, prohibited actions, protection measures, and self-imposed take limits, combined, will minimize effects to covered bird species such that implementation of restoration actions are not expected to affect species abundance, productivity, distribution, or genetic diversity of any covered bird population within the Action Area. The USFWS expects that the number and productivity of any covered bird species will not be appreciably reduced or diminished across the ranges of each species. As the quality and quantity of habitat is improved, the long-term viability of local populations will likely be enhanced.

3.4.2.3.2. Herbicide Use

The application of herbicides is not reasonably certain to kill or injure covered bird species, nor is it reasonably certain to modify their habitat to such an extent that their essential behavior patterns are significantly impaired or disrupted. This is because, the work windows will avoid or limit treatment to outside nesting season, and during that time, birds will have the ability to move and are likely to avoid the area during treatment. In addition, the herbicides proposed for use are generally considered of low toxicity to avian species. The general protection measures described above will ensure herbicides are only used when and where necessary, minimize overexposure by ensuring herbicides are applied correctly and according to label, and reduce the risk of herbicide application on non-target species.

3.4.2.3.3. Species-Specific Analyses

3.4.2.3.3.1. California least tern

California least terns occur along the Pacific coast of California and Baja California, Mexico. California least tern nesting sites are confined to 29 areas along the California coast. They nest on sand that is interspersed with larger fragments of material and sparse ground vegetation and forage at nearshore waters, estuarine channels, narrow bays, and other shallow water marine habitat. Typical foraging habitat is within two miles of colony sites (see Appendix C). Thus, it is expected that some aquatic restoration projects will occur in the areas where California least tern occur. The California least tern is most likely to be affected by techniques used for floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat; establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands; and establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites.. Effects from these proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The California Least Tern 5-year Review recognizes that conservation of the California least tern is dependent on continued cooperation with partners to aid in future restoration (USFWS 2020c). This aligns well with the restoration projects for which this PBO is addressing. Degraded habitat conditions are a common stressor to native bird species. Most of the restoration activities that would adversely affect covered birds would occur when covered bird species occur within or adjacent to aquatic habitats.

In addition to the General Protection Measures, the California least tern Protection Measures provide specific requirements to minimize impacts and avoid lethal take from restoration project activities by avoiding occupied habitat to the maximum extent possible (CLT-1); avoiding adverse effects to nesting California least terns by limiting work in suitable habitat to the California least tern's nonbreeding season, 1 October through 28/29 February, when north of the Monterey/San Luis Obispo county line; and September 16 through March 31, when south of the Monterey/San Luis Obispo county line. Limitations for work adjacent to suitable habitat is also provided (WSP-2); providing construction and noise buffers to minimize adverse effects since lethal take is not authorized (WSP-3); marking the work site boundaries to avoid impacting California least terns (WSP-4); measures to restrict vehicles in suitable nesting habitat (WSP-5); measures to deter predators (WSP-6); and measures to use handheld tools (WSP-7).

The self-imposed take limit provided in the project description of this PBO does not allow any lethal take of California least tern. Harm may occur due to noise or other indirect effects. Harm will be minimized by the requirement that the Project Proponent and local USFWS Field Office work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a tern colony. In addition, no net loss of habitat, through implementation of protection measures and/or offsetting impacts with habitat restoration or enhancement, is allowed.

Given all the protection measures to minimize the number of California least tern adversely affected by the proposed action, the eligibility criteria and prohibited acts, the limitation of no lethal take, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.3.3.2. California clapper rail

The California clapper rail (California Ridgway's rail) is restricted to the tidal and brackish marshes of San Francisco Bay. The Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California, which addresses California clapper rails, requires a combination of interim and long-term actions. Long-term actions involve large-scale tidal marsh restoration and implementation of long-term management plans (USFWS 2013a). California clapper rail are most likely to be affected by techniques used for establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

Several marsh restoration projects, in various stages of implementation, in the north and south San Francisco Bay and in Suisun Marsh may increase habitat for the California clapper rail. The eligible project types covered in this PBO include various marsh restoration activities. However, due to other existing programmatic consultations in the San Francisco Bay area, including Suisun Bay, it is unclear how often this PBO may be used for such activities within California clapper rail habitat.

In addition to the General Protection Measures, the following General Rail Protection Measures avoid disturbance to suitable habitat (RAILS-1); identifying the boundaries of suitable habitat (RAILS-2); restrictions to site access to minimize impacts to occupied habitat (RAILS-3); measures to discourage predators (RAILS-4); measures to use handheld tools (RAILS-5); and prohibition on soil stabilization or offsite materials in occupied habitat (RAILS-6). California clapper rail Protection Measures provide specific requirements to minimize impacts by providing standards associated with presence/absence surveys (CRR-1) and measures to avoid impacts to California clapper rail via timing restrictions, breeding season restrictions, and non-breeding season restrictions. These measures include the requirement for all activities to be halted, if rails are encountered, until the individual rail has left the area on its own.

The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than one individual annually. In addition, the local USFWS Field Office and Project Proponent are required work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area. Lastly, there is a requirement of no net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.

Given all the protection measures to minimize the number of California clapper rail adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with recovery plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.3.3.3. Coastal California gnatcatcher and its critical habitat

Coastal California gnatcatcher

Coastal California gnatcatchers occur in coastal southern California and northwestern Baja California, Mexico. They are closely aligned with coastal scrub vegetation (see Appendix C). Although habitat restoration and enhancement needs are recognized for the Coastal California Gnatcatcher, upland habitat restoration is not the focus of the restoration activities in this PBO, but adjacent upland areas to aquatic and riparian habitat will likely experience adverse effects associated with a restoration project. Thus, the coastal California gnatcatcher is most likely to be affected by techniques used for establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

In addition to the General Protection Measures, the following coastal California gnatcatcher Protection Measures provide specific requirements to minimize impacts by requiring a habitat assessment by a Qualified Biologist (CAGN-1); by avoiding and minimizing impacts in suitable habitat (CAGN-2); and by restricting all clearing of vegetation in coastal California gnatcatcher suitable habitat to outside the breeding season (February 15 through August 30). If the breeding season can't be avoided, additional measures are required for surveys by a USFWS-Approved Biologist and establishment of nest buffers (CAGN-3).

The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than one nest annually. Mortality to a nest would include disturbance to an active nest with egg(s) or chick(s) in the nest or if fledglings(s) are still dependent on the nest for survival. It also limits harm to no more than two individual coastal California gnatcatchers annually. Lastly, it requires no net loss of coastal California gnatcatcher habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.

Given all the protection measures to minimize the number of coastal California gnatcatchers adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in more detail in Appendix C, 11 units of critical habitat was designated in Ventura, Los Angeles, Orange, Riverside, San Bernardino, and San Diego Counties, California. The Primary Constituent Elements consist of the following summarized two components PCE-1) Dynamic and successional sage scrub habitats that provide space for individual and population growth, normal behavior, breeding, reproduction, nesting, dispersal and foraging; and PCE-2) non-sage scrub habitats such as chaparral, grassland, riparian areas, in proximity to sage scrub habitats.

Most restoration projects that would use this PBO are predominantly aquatic; and as such, restoration projects with activities in coastal California gnatcatcher critical habitat is expected to be uncommon.

While the proposed action will have adverse effects to coastal California gnatcatcher critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project-level through the combination of the eligibility requirements, prohibited actions, protection measures, and self-imposed take limits. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following minimizes impacts to coastal California gnatcatcher habitat and critical habitat function: 1) No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement; 2) project impacts will be avoided or minimized in coastal sage scrub, alluvial fan scrub, and other vegetation communities suitable for this species (CAGN-3); and 3) the following prohibited act: Restoration projects that would result in a net loss of designated critical habitat function for any federally-

listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.3.3.4. Least Bell's Vireo and its critical habitat

Least Bell's vireo

Least Bell's vireo occurs in San Diego, Riverside, Orange, San Bernardino, Los Angeles, Ventura, Santa Barbara, Inyo, and Kern Counties, with infrequent nesting in Monterey, San Benito, and Stanislaus Counties, California. Least Bell's vireos are obligate riparian breeders and occur in several riparian habitat types (see Appendix C). Since least Bell's vireo is a riparian bird, it will likely be adversely affected by most of the restoration projects covered in this PBO. Effects from these proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The draft Least Bell's Vireo Recovery Plan recognizes the need for restoration of riparian habitats (see Appendix C). This aligns well with the restoration projects for which this PBO is addressing. Degraded riparian habitat conditions are a common stressor among aquatic wildlife and riparian birds. Most of the restoration activities that would adversely affect least Bell's vireo are those that occur within or adjacent to riparian areas.

In addition to the General Protection Measures, the following least Bell's vireo Protection Measures provide specific requirements to minimize impacts by requiring a habitat assessment by a Qualified Biologist (LBV-1); by avoiding and minimizing impacts in suitable habitat, including specific measures to avoid mature riparian vegetation (LBV-2); and by restricting all clearing of vegetation in least Bell's vireo occupied habitat or potential suitable habitat to outside the breeding season (September 16 – March 14). If the breeding season can't be avoided, additional measures are required for surveys by a USFWS-Approved Biologist (LBV-3); and specific additional measure to minimize impacts if an active nest is detected (LBV-4).

The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than 8 individuals and 4 nests annually. Mortality to a nest would include disturbance to an active nest with egg(s) or chick(s) in the nest or if fledglings are still dependent on the nest for survival. The project proponent is required to work with the local USFWS Field Office during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of an occupied pair's territory, except for restoration projects where the purpose is to remove non-native vegetation to improve least Bell's vireo habitat. Lastly, it requires no net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.

Given all the protection measures to minimize the number of least Bell's vireo adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to

native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in more detail in Appendix C, least Bell's vireo critical habitat occurs in 10 areas in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego Counties, California. The Primary Constituent Elements 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.

Since many of the restoration projects that would use this PBO would occur in or adjacent to riparian areas, the proposed action will have adverse effects to least Bell's vireo critical habitat at the local, site-specific scale; these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, protection measures, and self-imposed take limits. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following minimizes impacts to least Bell's vireo habitat and critical habitat function: 1) No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement; 2) project impacts will be avoided or minimized in least Bell's vireo suitable habitat by requiring staging and temporary construction areas be outside of suitable habitat and use existing roads and developed areas to the maximum extent practicable. All mature riparian vegetation (e.g., willows and cottonwoods) greater than 30 feet in height will be avoided. If mature riparian vegetation cannot be avoided, it will be either transplanted elsewhere in or near the project area or placed horizontally or diagonally outside the project footprint (LBV-2); and 3) the following prohibited act: Restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.3.3.5. Light-footed Ridgway's rail

The light-footed Ridgway's rail inhabits coastal marshes, lagoons, and some freshwater habitats in Southern California and northern Baja California, Mexico. The light-footed Ridgway's rail 5-year review recognizes that freshwater marshes should be considered as an option for future restoration and protection to benefit the light-footed Ridgway's rail (USFWS 2020b). Light-footed Ridgway's rail is most likely to be affected by techniques used for tidal wetland establishment, restoration, or enhancement projects. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

In addition to the General Protection Measures and the General Rail Protection Measures, the light-footed Ridgway's rail Protection Measures provide specific requirements to minimize impacts by requiring a habitat assessment by a Qualified Biologist (LFRR-1) and by limiting

project activity in habitat where presence has been confirmed, or is presumed, to September 16 through March 14 to avoid impacts to light-footed Ridgway's rail. If the breeding season can't be avoided, additional measures to buffer the occupied habitat is provided (LFRR-2).

The self-imposed take limit provided in the project description of this PBO limits harm to no more than 5% of a given population annually. In addition, the local USFWS Field Office and Project Proponent is required to work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area. Lastly, it requires no net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement. The local USFWS Field Office can provide technical assistance to the project proponent to define the 5% limit based on the most recent population survey data.

Given all the protection measures to minimize the number of light-footed Ridgway's rail adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.3.3.6. Marbled Murrelet and its critical habitat

Marbled murrelet

Marbled murrelets occur in Washington, Oregon and California. They use forested habitat within 25 miles of the California coast (see Appendix C). Upland habitat restoration is not the focus of the restoration activities in this PBO, but adjacent upland areas to aquatic and riparian habitat will likely experience adverse effects associated with a restoration project. Thus, marbled murrelets are most likely to be affected by techniques used for establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for Marbled Murrelet includes recommendations to increase the quality of suitable nesting habitat. This aligns well with the restoration projects for which this PBO is addressing. Degraded habitat conditions are a common stressor to native bird species. Most of the restoration activities that would adversely affect covered birds would occur when covered bird species occur within or adjacent to aquatic habitats.

In addition to the General Protection Measures, the following marbled murrelet Protection Measures provide specific requirements to minimize impacts by providing specific work restriction requirements for unoccupied habitat (MAMU-1); work restriction requirements for occupied habitat (MAMU-2); and work restriction requirements for critical habitat (MAMU-3). The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than one nesting murrelet pair and their dependent young (1 egg/chick per annual clutch) per recovery unit annually.

Given all of the protection measures to minimize the number of marbled murrelets adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in more detail in Appendix C, marbled murrelet critical habitat occurs in 101 units in Washington, Oregon and California. In California, 13 units have been designated. The Primary Constituent Elements include PCE-1) Individual trees with potential nesting platforms; and PCE-2) Forested lands of at least one-half site potential tree height regardless of contiguity within 0.8 kilometers (0.5 miles) of individual trees with potential nesting platforms, and that are used or potentially used by murrelets for nesting or roosting. Most restoration projects that would use this PBO are predominantly aquatic and as such projects with activities in marbled murrelet critical habitat is expected to be uncommon.

While the proposed action will have adverse effects to marbled murrelet critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following minimizes impacts to marbled murrelet habitat and critical habitat function: 1) No potential marbled murrelet nest trees will be removed during any time of year (MAMU-1); 2) removal or damage of known or potential nest trees will be avoided; 3) removal or damage of trees with potential nesting platforms will be avoided; 4) project activities will not alter suitable nesting habitat to the extent that it is no longer functioning; and 5) the following prohibited act: Restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.3.3.7. Northern spotted owl and its critical habitat

Northern spotted owl

Northern spotted owl occur in coastal ranges, and intervening forested lands in Washington, Oregon, and northern California. In California, the northern spotted owl range extends south to Marin County in the coast ranges and across the Klamath Mountains of northern California east to the Cascade Range where it meets the range of the California Spotted Owl near the Pit River (see Appendix C). Northern spotted owls are nocturnal, highly territorial and reliant on forested landscapes. Upland habitat restoration is not the focus of the restoration activities in this PBO, but adjacent upland areas to aquatic and riparian habitat will likely experience adverse effects associated with a restoration project. Thus, northern spotted owls are most likely to be affected by techniques used for establishment, restoration, and enhancement of stream and riparian

habitat and upslope watershed sites. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for Northern Spotted Owl recognizes the need for restoration management actions to maintain and restore northern spotted owl habitat (see Appendix C). It is possible a restoration project may be in the vicinity of an owl nest and cause disturbance to individual owls, especially if there is a conflict with an established in-water work period for a covered fish species or if extended time is needed to complete a large or complicated restoration project. However, such circumstances are expected to be uncommon because restoration of lower elevation aquatic habitats are generally away from northern spotted owl habitat and recovery projects specifically to benefit northern spotted owl are not the focus of the activities covered in this PBO.

In addition to the General Protection Measures, the following northern spotted owl Protection Measures provides specific requirements to minimize impacts by requiring the Project Proponent to contact the USFWS to access the most up-to-date survey data (NSO-1); requirements associated with when and how to conduct surveys for northern spotted owl (NSO-2); habitat avoidance measures that include specific measures regarding nest trees, screen trees, and snags (NSO-3); measures to avoid reducing habitat quality by requiring no net loss of habitat or downgrade or removal of function of suitable nesting, roosting, and foraging habitat (NSO-4); foraging habitat avoidance measures (NSO-5); and measures to reduce impacts to northern spotted owl from noise and smoke (NSO-6 and NSO-7). The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than 18 nesting individuals harmed from disturbance annually.

Given all the avoidance and protection measures to minimize the number of northern spotted owls adversely affected by the proposed action by disturbance (e.g., loud and continuous noise), the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in more detail in Appendix C, northern spotted owl critical habitat occurs in 11 units and 60 subunits in California, Oregon, and Washington. In California, northern spotted owl critical habitat occurs in 3 units: Cascades, Klamath and Coast. The Primary Constituent Elements include PCE-1) Forest types that may be in early-, mid-, or late-seral stages and that support the northern spotted owl across its geographic range; PCE-2) Habitat that provides for nesting and roosting; PCE-3) Habitat that provides for foraging; and PCE-4) Habitat to support the transience and colonization phases of dispersal. Most restoration projects that would use this PBO are predominantly aquatic and as such projects with activities in northern spotted owl critical habitat is expected to be uncommon.

While the proposed action will have adverse effects to northern spotted owl critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger

scales. They will also be minimized at the project-level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following minimizes impacts to northern spotted owl habitat and critical habitat function: 1) Protection Measure NSO-3 that requires in all suitable nesting, roosting and foraging habitat: a) Removal or damage of known nest trees and associated screen trees will be avoided, unless they must be removed to implement the proposed project or are a confirmed safety hazard according to the guidance documents from the implementing agency or another agency with jurisdiction in the project area; b) Removal or damage of trees or snags with potential nesting platforms and associated screen trees will be avoided. These include trees with large flattened tops; large, broken-topped trees; trees with decadence, such as large cavities; mistletoe broom structures, catfaces, or large limbs; or large snags with these similar characteristics; and c) Removal of large (20 inches in diameter at breast height or larger) snags will be avoided, unless they must be removed to implement the proposed project or are a confirmed safety hazard according to the implementing agency's guidance documents; 2) Protection Measure NSO-4 that requires project activities not result in net loss of habitat or downgrade or remove the function of suitable NRF habitat to the degree that the habitat does not function in the capacity that existed prior to treatment: Although habitat elements such as individual large trees or snags may be removed from NRF habitat, the treatment must not be so extensive as to downgrade or remove the overall function of the habitat; 3) Protection Measure NSO-5 that requires avoidance of Foraging Habitat. In suitable foraging habitat in northern spotted owl core areas (a 0.5 mile- radius or 500-acre area around an Activity Center) and in suitable foraging habitat in northern spotted owl home ranges (a 1.3 mile-radius, including core, or a 3,398-acre area around an Activity Center): a)Downgrading or removal of suitable foraging habitat function will be avoided and b) Although habitat elements—such as individual trees, shrubs, down logs, and snags—may be removed from foraging habitat, the treatment must not be so extensive as to downgrade or remove the overall function of the habitat in a northern spotted owl core or home range below the recommended habitat levels for supporting survival, reproduction, and occupancy. In the interior California Klamath and California Cascades Provinces, this level is a combination of 400 acres of suitable NRF habitat in the core. For the home range, the level is 40% suitable NRF (approximately 1,336 acres). In the Redwood zone, the recommended level is 100 acres of suitable NRF habitat in the core and 500 acres of suitable NRF habitat in the home range; and 4) the following prohibited act: Restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.3.3.8. Western snowy plover – Pacific Coast population DPS and its critical habitat

Western snowy plover

Western snowy plovers nest within 50 miles of the Pacific Ocean on the mainland coast, peninsulas, offshore islands, bays, estuaries, or rivers of California and Baja California (see

Appendix C). The Western snowy plover breeds primarily above the high-tide line on coastal beaches, sand spits, dune-backed beaches, sparsely vegetated dunes, beaches at creek and river mouths, and salt pans at lagoons and estuaries. Less common nesting habitats include bluff-backed beaches, dredged material disposal sites, salt pond levees, dry salt ponds, and river bars. Thus, it is expected that some aquatic restoration projects will occur in the areas where western snowy plover occur. The western snowy plover is most likely to be affected by techniques used for floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat; establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands; and establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for Western Snowy Plover recognizes the need for restoration and enhancement of coastal dune habitat (USFWS 2007). This aligns well with the restoration projects for which this PBO is addressing. Degraded habitat conditions are a common stressor to native bird species. Most of the restoration activities that would adversely affect covered birds would occur when covered bird species occur within or adjacent to aquatic habitats.

In addition to the General Protection Measures, the Western Snowy Plover Protection Measures provide specific requirements to minimize impacts from restoration project activities by avoiding occupied habitat to the maximum extent possible (WSP-1); avoiding adverse effects to nesting plovers and dependent young by limiting work in suitable habitat to the western snowy plover's nonbreeding season October 1 through February 28/29 (or additional measures are required) (WSP-2); improving awareness of species and conservation measures through environmental awareness training (WSP-3); surveys for western snowy plovers by a USFWS-Approved Biologist (WSP-4 and WSP-5); measures to minimize effects if western snowy plovers occur in the Action Area, including protection of nests and no night work (WSP-5); and measures to deter predators (WSP-6).

The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than two individuals annually per recovery unit. It also requires the local USFWS Field Office and Project Proponent to work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of occupied plover habitat.

Given all the protection measures to minimize the number of western snowy plover adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in more detail in Appendix C, western snowy plover critical habitat occurs in 4 units within Washington, 9 units within Oregon, and 47 units within California. The units in California occur within Del Norte, Humboldt, Mendocino, Marin, Napa, Alameda, San Mateo, Santa Cruz,

Monterey, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego Counties. The Primary Constituent Elements consist of the following summarized four components: PCE-1) Areas that are below heavily vegetated areas or developed areas and above the daily high tides; PCE-2) Shoreline habitat areas for feeding that support small invertebrates; PCE-3) Surf- or water-deposited organic debris, such as seaweed (including kelp and eelgrass) or driftwood located on open substrates that supports and attracts small invertebrates; and PCE-4) Minimal disturbance which provide relatively undisturbed areas for individual and population growth and for normal behavior. Most restoration projects that would use this PBO are predominantly aquatic and as such projects with activities in western snowy plover critical habitat is expected to be uncommon.

While the proposed action will have adverse effects to western snowy plover critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, protection measures, and self-imposed take limits. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following minimizes impacts to western snowy plover habitat and critical habitat function: 1) the requirement that the local USFWS Field Office and Project Proponent work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of occupied plover habitat; 2) the protection measure to avoid occupied habitat to the maximum extent possible; and 3) the following prohibited act: Restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.4. Mammals

3.4.2.4.1. General

While the proposed restoration projects will cause some adverse effects to covered mammal species as identified in the general effects section above, these effects are expected to be short-term and localized, and thus relatively minor to the mammal populations. Because many of the restoration actions will contribute to addressing reduced aquatic habitat complexity, degraded riparian conditions, and improve habitats above the degraded environmental baseline, (particularly at the site scale), we anticipate these projects will support the recovery of covered mammal species in the long-term. Thus, while the proposed restoration activities will have site-specific effects, all proposed projects must result in a net increase in aquatic or riparian resource functions and/or services and be consistent with USFWS Recovery Plans or recovery-related documentation for Covered Species.

Most of the three species of mammals and critical habitat for San Bernardino Merriam's kangaroo rat covered in this PBO have very different biological needs. For example, the salt

marsh harvest mouse occurs only in tidal marsh ecosystems in the greater San Francisco Bay area and the San Bernardino Merriam's kangaroo rat occurs in alluvial sage scrub vegetation in San Bernardino and Riverside Counties. As such, no general mammal protection measures were established in the PBA. However, each of the covered mammal species has species-specific protection measures, as described in the project description of this PBO, to minimize the effects from restoration project implementation as described in the general effects section above. These protection measures are expected to greatly reduce the duration and extent of any adverse effects to individual mammals or their habitats.

While some restoration activities, and resulting exposures, are likely to result in injury or mortality for individuals (up to the self-imposed take limits provided in the project description), we expect few individual mammals to be adversely affected per project. The eligibility requirements, prohibited actions, protection measures, and self-imposed take limits, combined, will minimize effects to covered mammal species such that implementation of restoration actions are not expected to affect species abundance, productivity, distribution, or genetic diversity of any covered mammal population within the Action Area. The USFWS expects that the number and productivity of any covered mammal species will not be appreciably reduced or diminished across the ranges of each species. As the quality and quantity of habitat is improved, the long-term viability of local populations will likely be enhanced.

3.4.2.4.2. Herbicide Use

Although herbicide application will likely result in adverse health effects (mortality and sublethal effects) to covered mammal species, including their young, application of herbicides is not reasonably certain to kill or injure covered mammal species, nor is it reasonably certain to modify their habitat to such an extent that their essential behavior patterns are significantly impaired or disrupted. This is because mammals have the ability to move and are likely to avoid the area during treatment. In addition, the herbicides described above were found to have limited adverse effects to mammal species. For many of the herbicides, it was found that larger mammals appear to be more sensitive than smaller mammals. Lastly, the general protection measures, described above, will also ensure herbicides are only used when and where necessary, minimize over exposure by ensuring herbicides are applied correctly and according to label, and reduce the risk of herbicide application on non-target species.

3.4.2.4.3. Species-Specific Analyses

3.4.2.4.3.1. Riparian woodrat

As provided in more detail in Appendix C, the only known extant population of riparian woodrat is small, with its size limited by the available habitat (USFWS 1998a). Riparian woodrats prefer habitat with a large amount of overall structure, with both understory vegetation and overstory cover (Gerber et al 2003). Since riparian woodrats occur in riparian habitat, they will likely be adversely affected by many of the restoration projects covered in this PBO, including floodplain

restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat; establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands; and establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites. Effects from these proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

One of the goals of the recovery plan is to restore and link riparian habitat (USFWS 2012b). This objective aligns well with the restoration projects for which this PBO is addressing.

In addition to the General Protection Measures, the riparian woodrat Protection Measures provides specific requirements to minimize impacts from restoration projects by requiring habitat assessments and surveys (RW-RBR-1), habitat avoidance measures for occupied habitat (RW-RBR-2), and habitat avoidance measures for unoccupied habitat (RW-RBR-3). The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than five adults, 12 subadults, and 3 nests annually.

Given all the protection measures to minimize the number of riparian woodrats adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.4.3.2. Riparian brush rabbit

As provided in more detail in Appendix C, the only known extant population of riparian brush rabbit is at Caswell Memorial State Park. Riparian brush rabbits require nearly continuous shrub cover and seldom move more than 1 m (3 ft.) from cover. They will not cross large, open areas, and therefore are unable to disperse beyond the dense brush of the riparian forest at Caswell Memorial State Park (USFWS 1998a). The short-term population trend is relatively stable (NatureServe 2015). Since riparian brush rabbit occur in riparian habitat, they will likely be adversely affected by many of the restoration projects covered in this PBO, including floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat; establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands; and establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites. Effects from these proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

In addition to the General Protection Measures, the riparian brush rabbit Protection Measures provide specific requirements to minimize impacts from restoration projects by requiring habitat assessments and surveys (RW-RBR-1), habitat avoidance measures for occupied habitat (RW-RBR-2), and habitat avoidance measures for unoccupied habitat (RW-RBR-3). The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than five adults, 12 subadults, and 3 nests annually.

Given all the protection measures to minimize the number of riparian brush rabbit adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.4.3.3. Salt marsh harvest mouse

As provided in more detail in Appendix C, the salt marsh harvest mouse is restricted to the tidal and brackish marshes of San Francisco, San Pablo, and Suisun Bay areas. Although there currently is no USFWS range-wide salt marsh harvest mouse monitoring program or protocol, various mouse survey results appear to suggest positive population trends from 2010 to 2019 for several sites; however, the Suisun Bay Area Recovery Unit may be experiencing a negative population trend (USFWS 2021a). Habitat loss is the main threat to the salt marsh harvest mouse and the basic strategy for recovery of the salt marsh harvest mouse is the protection, enhancement, and restoration of extensive, well-distributed habitat suitable for the species (USFWS 2013). Salt marsh harvest mice are most likely to be affected by techniques used for floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

Several marsh restoration projects, in various stages of implementation, in the north and south San Francisco Bay and in Suisun Marsh may increase habitat for the salt marsh harvest mouse (USFWS 2021a). The eligible project types covered in this PBO include various marsh restoration activities. However, due to other existing programmatic consultations in the San Francisco Bay area, including Suisun Bay, it is unclear how often this PBO may be used for such activities within salt marsh harvest mouse habitat.

For any restoration projects within suitable habitat of the salt marsh harvest mouse, the following species-specific measure is required, in addition to the General Protection Measures: avoid and minimize effects to the salt marsh harvest mouse where construction activities would occur in suitable habitat within the current range of the species (SMHM-1): disturbance buffers, USFWS-Approved Biologist will identify suitable habitat, vegetation clearing methods to minimize adverse effects, work limited to daytime hours, and post construction vegetation disturbance minimization measures. The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than two individuals and one nest equivalent. One nest equivalent is equal to all young within the nest or four total juveniles if a nest is not found. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a population in the project area. No net loss of habitat through implementation of protection measures and/or offsetting impacts with habitat restoration or enhancement.

Given all of the protection measures to minimize the number of salt marsh harvest mice adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.4.3.4. San Bernardino Merriam's kangaroo rat critical habitat

The San Bernardino kangaroo rat species was found not likely to be adversely affected by the proposed action due to species-specific protection measures (See Appendix D). However, it was found that critical habitat may be adversely affected by the proposed action. As such, we are analyzing the effect of the proposed action on San Bernardino kangaroo rat critical habitat here. Upland habitat restoration is not the focus of the restoration activities in this PBO, but adjacent upland areas to aquatic and riparian habitat will likely experience adverse effects associated with a restoration project. Thus, San Bernardino Merriam's kangaroo rat critical habitat is most likely to be affected by techniques used for establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

As provided in more detail in Appendix C, the primary constituent elements for the San Bernardino kangaroo rat include: PCE-1) Soil series consisting predominantly of sand, loamy sand, sandy loam, or loam; PCE-2) Alluvial sage scrub and associated vegetation, such as coastal sage scrub and chamise chaparral, with a moderately open canopy; PCE-3) River, creek, stream, and wash channels; alluvial fans; floodplains; floodplain benches and terraces; and historic braided channels that are subject to dynamic geomorphological and hydrological processes typical of fluvial systems within the historical range of the San Bernardino kangaroo rat; and PCE-4) Upland areas proximal to floodplains with suitable habitat (e.g., floodplains that support the soils, vegetation, or geomorphological, hydrological and aeolian processes essential to this species). As such, San Bernardino kangaroo rat critical habitat occurs in areas where restoration projects are of interest.

Thus, the proposed action will have adverse effects to San Bernardino kangaroo rat critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following minimizes impacts to San Bernardino kangaroo rat habitat and critical habitat function: 1) No permanent or temporary loss of San Bernardino kangaroo rat occupied or presumed occupied habitat will occur unless take can be avoided and effects to the habitat are determined to be insignificant at the project level; 2) no permanent loss of designated critical habitat will occur, unless determined to be insignificant at the project level; and 3) the following prohibited act: Restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and

includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.5. Non-vernal Pool Invertebrate Species

3.4.2.5.1. General

While the proposed restoration projects will cause some adverse effects to covered non-vernal pool invertebrate species as identified in the general effects section above, these effects are expected to be short-term and localized, and thus relatively minor to the non-vernal pool invertebrate populations. Because many of the restoration actions will contribute to addressing reduced aquatic habitat complexity, degraded riparian conditions, and improve habitats above the degraded environmental baseline (particularly at the site scale), we anticipate these projects will support the recovery of covered non-vernal pool invertebrate species in the long-term. Thus, while the proposed restoration activities will have site-specific effects, all proposed projects must result in a net increase in aquatic or riparian resource functions and/or services and be consistent with USFWS Recovery Plans or recovery-related documentation for Covered Species.

The four species of non-vernal pool invertebrates have very different biological needs. For example, Valley elderberry longhorn beetle is dependent upon its host plant, blue elderberry in riparian areas of the Central Valley and California freshwater shrimp is found in freshwater streams in central coastal California. As such, no general non-vernal pool invertebrate protection measures were established in the PBA. However, each of the covered non-vernal pool invertebrate species has species-specific protection measures, as described in the project description of this PBO, to minimize the effects from restoration project implementation as described in the general effects section above. These protection measures are expected to greatly reduce the duration and extent of any adverse effects to individual non-vernal pool invertebrates and their habitats.

While some restoration activities, and resulting exposures, are likely to result in injury or mortality for individuals (up to the self-imposed take limits provided in the project description), we expect few individual non-vernal pool invertebrates to be adversely affected per project. The eligibility requirements, prohibited actions, protection measures, and self-imposed take limits, combined, will minimize effects to covered non-vernal pool invertebrate species such that implementation of restoration actions are not expected to affect species abundance, productivity, distribution, or genetic diversity of any covered non-vernal pool invertebrate population within the Action Area. The USFWS expects that the number and productivity of any covered non-vernal pool invertebrate species will not be appreciably reduced or diminished across the ranges of each species. As the quality and quantity of habitat is improved, the long-term viability of local populations will likely be enhanced.

3.4.2.5.2. Herbicide Use

Herbicide applications will likely negatively affect non-vernal pool invertebrates. However, limited information is available on effects of these chemicals to non-target species. Some information is provided on butterfly species and indicate that all butterfly life stages and their host and nectar plants may be affected due to herbicides reaching these non-target species from herbicide drift, over-spray, run-off, and/or soil transport. However, the potential for herbicides to come into contact with Smith's blue butterflies and their host and nectar plants will be eliminated or minimized based on the following information: Herbicide protection measures will minimize the potential use of herbicides and to the minimum area necessary and the following protection measure will ensure larval host plants are known and protected:

- Butterfly-4, Environmentally Sensitive Areas. Any larval food or host plants found within 300 feet of the project footprint will be clearly marked.
    - For projects where Smith's blue butterfly species are present or assumed to be present, larval food or host plants will be avoided to the maximum extent practicable (see Table 10).
    - For all projects where Smith's blue butterfly are present or assumed to be present, prior to any ground- disturbing or vegetation removal activities, the edge of the work area near any larval food or host plants will be clearly marked in coordination with a USFWS-Approved Biologist to prevent workers and vehicles from entering this area.

Thus, although herbicide application will likely result in adverse health effects (mortality and sublethal effects) to all life stages of covered non-vernal pool invertebrate species, the general and specific protection measures will ensure herbicides are only used when and where necessary, minimize over exposure by ensuring herbicides are applied correctly and according to label, and reduce the risk of herbicide application on non-target species.

3.4.2.5.3. Species-Specific Analysis

3.4.2.5.3.1. Mount Hermon June beetle

As described in Appendix C, the Mount Hermon June Beetle occurs in the Scotts Valley-Mount Hermon-Felton-Ben Lomond area of the Santa Cruz Mountains, California. It is restricted to Zayante sands soils derived from ancient sand deposits, known as the Santa Margarita formation. The Mount Hermon June beetle has only one generation per year and it is thought that the entire lifecycle takes 2 to 3 years. The majority of the Mount Hermon June beetle's life cycle is spent as a subterranean larval stage that feeds on plant roots. As its common name suggests, adult emergence and seasonal activity often begins in June and adult males have been observed in the months of June, July, August, and September. Upland habitat restoration is not the focus of the restoration activities in this PBO, but adjacent upland areas to aquatic and riparian habitat will likely experience adverse effects associated with a restoration project. Thus, Mount Hermon June beetle are most likely to be affected by techniques used for establishment, restoration, and

enhancement of stream and riparian habitat and upslope watershed sites. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

In addition to the General Protection Measures, the Mount Hermon June Beetle Protection Measures provides specific requirements to minimize impacts from restoration activities by requiring training of construction personnel by a USFWS-Approved Biologist and if observed in the project site, the USFWS-Approved Biologist will relocate Mount Hermon June beetles (relocation methods are described in MHJB-1); avoiding impacts during flight season (May 15 – August 15)(MHJB-2); restricting outdoor lighting (MHJB-3); and limiting landscaping elements that can degrade Mount Hermon June beetle habitat. The self-imposed take limit provided in the project description of this PBO limits injury or mortality to no more than 20 individuals annually.

Given all the protection measures to minimize the number of Mount Hermon June beetle adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.5.3.2. Smith's blue butterfly

As described in Appendix C, the Smith's blue butterfly occurs in Monterey County and San Luis Obispo County, California. They co-occur with buckwheat plants that grow in coastal dune, cliffside chaparral, coastal scrub, and coastal grassland communities. The Smith's blue butterfly is inextricably dependent upon its host plant species, seacliff buckwheat (*Eriogonum parviflorium*) and coast buckwheat (*Eriogonum latifolium*), during all life stages and adults may also feed on nectar from naked buckwheat (*Eriogonum nudum*). Urban development, recreational activities, and other activities continue to result in habitat loss and degradation. The general recovery needs of the Smith's blue butterfly include increasing the amount of occupied habitat through restoration efforts. Upland habitat restoration is not the focus of the restoration activities in this PBO, but adjacent upland areas to aquatic and riparian habitat will likely experience adverse effects associated with a restoration project. Thus, Smith's blue butterfly are most likely to be affected by techniques used for establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

In addition to the General Protection Measures, General Butterfly Protection Measures require preconstruction surveys with specifics for flight season and nonflight season (Butterfly-1); project footprint minimization requirements (Butterfly-2); monitoring by a USFWS-Approved Biologist (Butterfly-3); marking any larval food or host plants (Butterfly-4); measures to control dust (Butterfly-5); measures to avoid or minimize impacts to Smith's blue butterfly if found in the work area (Butterfly-6); and requirements and measures to restore any Smith's blue butterfly

habitat temporarily impacted (Butterfly-7). The self-imposed take limit provided in the project description of this PBO limits the loss of no more than 25 host plants annually.

Given all the protection measures to minimize the number of Smith's blue butterfly adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.5.3.3. Valley elderberry longhorn beetle and its critical habitat

Valley elderberry longhorn beetle

As described in Appendix C, the Valley elderberry longhorn beetle occurs in the Central Valley of California. The valley elderberry longhorn beetle is a habitat specialist and spends almost its entire life history on the sole host plant, blue elderberry. The species is dependent on the blue elderberry plant for larval and adult life stages. Blue elderberries are an important component of riparian ecosystems in California. The valley elderberry longhorn beetle has very limited dispersal; it usually stays on or near the host plant for the duration of its life. Since valley elderberry longhorn beetles occur in riparian habitat, they will likely be adversely affected by many of the restoration projects covered in this PBO, including floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat; establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands; and establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites. Effects from these proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan includes recommendations to enhance and restore suitable habitat for the Valley elderberry longhorn beetle (USFWS 2019c). This aligns well with the restoration projects for which this PBO is addressing.

In addition to the General Protection Measures, Valley Elderberry Longhorn Beetle Protection Measures require the Project Proponent to follow the May 2017 USFWS Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (USFWS 2017b) (VELB-1) and requires riparian revegetation to include elderberry seedlings in the planting mix when in the range of Valley elderberry longhorn beetle (VELB-2). The self-imposed take limit provided in the project description of this PBO limits the loss of no more than 50 shrubs annually.

Given all the protection measures to minimize the number of Valley elderberry longhorn beetle adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in more detail in Appendix C, critical habitat for the Valley elderberry longhorn beetle occurs in Sacramento County, California. The specific physical and biological features are not available. However, the host plant would be of primary importance to Valley elderberry longhorn beetles. Since the host plant occurs in riparian areas, the Valley elderberry longhorn beetle critical habitat occurs in areas where restoration projects are of interest.

Thus, the proposed action will have adverse effects to Valley elderberry longhorn beetle critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, protection measures, and self-imposed take limits. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following prohibited act minimizes impacts to Valley elderberry longhorn beetle habitat and critical habitat function: Restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.5.3.4. California freshwater shrimp

As provided in more detail in Appendix C, California freshwater shrimp occur in a few coastal streams in Marin, Sonoma, and Napa counties in California. California freshwater shrimp are most likely found in areas with bottom substrates dominated by sand (USFWS 1998b). They require high water quality, low pollution, and good oxygen levels, and have a low tolerance for other conditions. The Recovery Plan for California freshwater shrimp include restoration activities (USFWS 198b). This aligns well with the restoration projects for which this PBO is addressing.

In addition to the General Protection Measures and Fish Protection Measures, the California freshwater shrimp Protection Measures provide specific requirements for preconstruction surveys (CAFS-1); work restrictions associated with wet weather (CAFS-2); restrictions on access routes to avoid stream banks and removal of trees (CAFS-3); specific measures to minimize effects during capture and relocation measures associated with in-water work (CAFS-4); measures to avoid and minimize adverse effects to California freshwater shrimp from dewatering activities (CAFS-5); avoidance of areas occupied by shrimp and measures to minimize disturbance and removal of aquatic vegetation (CAFS-6); and requirements to rehabilitate disturbed habitat (CAFS-7). The self-imposed take limit provided in the project description of this PBO allows injury or mortality to no more than 3% of captured and relocated individuals per project.

Given all the protection measures to minimize the number of California freshwater shrimp adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.6. Vernal Pool Species

3.4.2.6.1. General

While the proposed restoration projects will cause some adverse effects to covered vernal pool plant and animal species as identified in the general effects section above, these effects are expected to be short-term and localized, and thus relatively minor to the vernal pool plant and animal populations. Because many of the restoration actions will contribute to addressing reduced aquatic habitat complexity, degraded riparian conditions, and improve habitats above the degraded environmental baseline, (particularly at the site scale), we anticipate these projects will support the recovery of covered vernal pool plant and animal species in the long-term. Thus, while the proposed restoration activities will have site-specific effects, all proposed projects must result in a net increase in aquatic or riparian resource functions and/or services, no net loss of vernal pool habitat, and be consistent with USFWS Recovery Plans or recovery-related documentation for Covered Species.

The general vernal pool Branchiopoda protection measures for limiting work during the dry season (VPBR-1) and restrictions for work during the wet season (VPBR-3), requiring a biological monitor (VPBR-2), site restrictions to buffer vernal pools from staging areas and mixing of chemicals (VPBR-4), erosion control measures (VPBR-5), dust control measures (VPBR-6), measures to prevent hybridization (VPBR-7), and herbicide application, clearing, and ground disturbance measures (VPBR-8), ground disturbance measures when restoration activity is to improve habitat for covered Branchiopoda (VPBR-9) are intended to minimize the effects from restoration project implementation as described in the general effects section above. These protection measures are expected to greatly reduce the duration and extent of any adverse effects to individual vernal pool animal species or their habitat.

The general plant protection measures apply to all vernal pool plant species, including requirements for conducting habitat assessments and surveys when all potentially occurring covered plants are identifiable, usually in the flowering, peak flowering, or fruiting stage (PLANT-1), establishment of exclusion buffers (PLANT-2), measures to provide exceptions to the work restrictions and exclusion buffers while minimizing adverse effects to plants (PLANT-3), additional season avoidance beyond the exclusion buffer for some species (PLANT-4), biological monitor requirements (PLANT-5), measures to avoid and minimize impacts to covered plant species from herbicide application, clearing and ground disturbance (PLANT-6), and measures to minimize adverse effects when effects to covered plant species cannot be avoided (PLANT-7). Plant protection measures 4 and 8 provide vernal pool plant specific measures to further minimize effects to covered vernal pool plant species. Plant protection

measure 4 requires additional seasonal avoidance beyond the exclusion buffer for vernal pool plant species (PLANT-4) and measure 8 provides additional measure to minimize effects to vernal pool plant species from temporary vernal pool habitat impacts. All of these measures are intended to minimize the effects from restoration project implementation as described in the general effects section above. These protection measures are expected to greatly reduce the duration and extent of any adverse effects to individual covered vernal pool plant species or their habitats. In addition, the following is a prohibited activity under this PBO: Projects that would result in a net loss of vernal pool habitat.

However, since impacts up to 10% of some pools may be authorized because of the self-imposed take limit for Conservancy fairy shrimp, Longhorn fairy shrimp, Riverside fairy shrimp, San Diego fairy shrimp, Vernal pool fairy shrimp, and vernal pool tadpole shrimp, vernal pool plant species that occur in such pools may be adversely affected by project activities. In addition, because this 10% limit can be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS Field Office, via the ESA Section 7(a)(2) Review Form process, some of the plant protection measures below may not apply to such projects. In such cases, the USFWS Field Office will work the Project Proponent to identify project-specific vernal pool plant species protection measures in order to minimize impacts during the restoration project.

Some restoration activities, and resulting exposures, are likely to result in injury or mortality for individuals (up to the self-imposed take limits provided in the project description), we expect few individual vernal pool plant and animals to be adversely affected per project. For those projects where the 10% habitat limit does not apply because the sole purpose of the project is to restore ecological function to the vernal pool, we expect most vernal pool plants and animals to be adversely affected; however, the USFWS Field Office will work the Project Proponent to identify project specific vernal pool species protection measures in order to minimize impacts. The eligibility requirements, prohibited actions, protection measures, and self-imposed take limits, combined, will minimize effects to covered vernal pool plant and animal species such that implementation of restoration actions are not expected to affect species abundance, productivity, distribution, or genetic diversity of any covered vernal pool plant and animal population within the Action Area. The USFWS expects that the number and productivity of any covered vernal pool plant and animal species will not be appreciably reduced or diminished across the ranges of each species. As the quality and quantity of habitat is improved, the long-term viability of local populations will likely be enhanced.

3.4.2.6.2. Herbicide Use

Herbicide applications can negatively affect vernal pool plant and animals. Herbicide use in vernal pool habitat will likely kill vernal pool Branchiopoda species by poisoning. Also, herbicides could cause sub-lethal effect to shrimp food or prey via non-lethal toxicity, which could impact sensory, mobility, or reproductive processes for a limited period of time. Not much is known about specific adverse effects of herbicides on shrimp, but several adverse effects are possible. All shrimp life stages may be affected due to herbicides reaching these non- target

species from herbicide drift, over-spray, run-off, and/or soil transport. However, the potential for herbicides to come into contact with Branchiopoda will be eliminated or minimized based on the general protection measures and the following additional Vernal Pool species protection measures:

- **VPBR-4**, Site Restrictions. A buffer of at least 250 feet from any vernal pool, vernal pool grassland, or seasonal wetland will be established for the following:
    - Staging areas of all equipment for storage, fueling, and maintenance with hazardous-material-absorbent pads available in the event of a spill.
    - Mixing of pesticides, herbicides, or other potentially toxic chemicals.
- **VPBR-8**, Herbicide Application, Clearing, and Ground Disturbance Near Vernal Pools.
    - Work Near Vernal Pools During the Dry Season: A Qualified Biologist will flag or monitor all project implementation activities during the dry season (generally June 1 through October 15) within 250 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:
        - Hand-held herbicide application is prohibited in the pool or at the edge of the pool (as determined by the Qualified Biologist and indicated by features such as hydrophilic plants and topography).
        - Power spray herbicide application is prohibited within 100 feet of the edge of the pool.
        - Broadcast herbicide application is prohibited within 150 feet of the edge of the pool.
    - Work Near Vernal Pools During the Wet Season: A Qualified Biologist will flag or monitor all project implementation activities during the wet season (generally October 1 through June 1) within 150 feet of a vernal pool, vernal pool grassland, or seasonal wetland. The following buffers will be enforced:
        - Hand-held herbicide application is prohibited within 25 feet of the edge of the pool (as determined by the Qualified Biologist and indicated by features such as hydrophilic plants and topography).
        - Power spray herbicide application is prohibited within 100 feet of the edge of the pool.
        - Broadcast herbicide application is prohibited within 150 feet of the edge of the pool.

Thus, although herbicide application will likely result in adverse health effects (mortality and sublethal effects) to all life stages of covered vernal pool plant and animal species, the general and specific protection measures described above will ensure herbicides are only used when and where necessary, minimize over exposure by ensuring herbicides are applied correctly and according to label, and reduce the risk of herbicide application on non-target species.

3.4.2.6.3. Vernal Pool Branchiopoda Species-Specific Analyses

3.4.2.6.3.1. Conservancy fairy shrimp and its critical habitat

Conservancy fairy shrimp

The conservancy fairy shrimp occurs in the California Great Central Valley with one outlying population in Ventura County, California. Conservancy fairy shrimp are unique in that a majority of sites where they occur are relatively large and turbid vernal pools, often referred to as playa pools. Playa pools often remain inundated much longer than typical vernal pools. More information is provided in Appendix C. Conservancy fairy shrimp are most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The recovery strategy for the conservancy fairy shrimp includes restoring vernal pool habitat to promote the recovery of listed species and the long-term conservation of the species of concern (USFWS 2005b). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Thus, the proposed action allows the 10% temporary habitat loss self-imposed take limit to be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS Field Office, via the ESA Section 7(a)(2) Review Form process. In such cases, the USFWS Field Office will work with the Project Proponent to identify project specific vernal pool species protection measures in order to minimize impacts during the restoration project. Although such projects wouldn't be common among all the proposed restoration projects in a given year, they would result in the most adverse effects to covered vernal pool Branchiopoda and plants. However, restoring the vernal pool ecosystem will benefit these same species in the long-term.

Proposed restoration activities in and around vernal pool complexes will likely negatively affect fairy shrimp species and their habitats. Restoration actions will be designed to maintain or improve habitat for covered vernal pool plant and animal species, and in some instances may be necessary to maintain habitat suitability for fairy shrimp. Multiple measures are proposed to avoid and minimize impacts to fairy shrimp and include the General Protection Measures, Vernal Pool Branchiopoda Protection Measures, prohibited activities, and the self-imposed take limit provided in the project description of this PBO that limits impacts to no more than 10% temporary habitat loss per occupied pool (except for those projects where the sole purpose is to restore vernal pool ecological function). As described earlier, a net loss of vernal pool habitat is a prohibited act and not covered by this PBO. Implementation of some of these restoration activities may result in some adverse effects to individual fairy shrimp; however, we anticipate these effects will be short term in nature, localized to the project site, and not detectable at the population level. We cannot calculate the number of shrimp or eggs that might be killed or injured by incidental exposure to herbicides or other restoration actions but expect the actual effect to be low given the numerous proposed protection measures. These short-term adverse effects will be small and of limited duration, and are necessary to achieve long-term, beneficial

effects to fairy shrimp and vernal pool habitats that support this species. Most impacts to fairy shrimp resulting from these activities are expected to be insignificant, but there some will be harmed or killed. Thus, these activities may affect, and are likely to adversely affect fairy shrimp.

Given all the protection measures to minimize the number of conservancy fairy shrimp adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, conservancy fairy shrimp critical habitat occurs in eight units within Butte, Colusa, Mariposa, Merced, Solano, Stanislaus, Tehama, and Ventura Counties, California. Within these areas, the primary constituent elements for the conservancy fairy shrimp consist of the following summarized four components: PCE-1) Topographic features characterized by mounds and swales and depressions with flowing surface water in the swales connecting the pools; PCE-2) Depressional features that become inundated during winter rains; PCE-3) Sources of food; and PCE-4) Structure within the pools consisting of organic and inorganic materials.

Restoration in vernal pool complexes may alter soil and hydrologic conditions, resulting in short-term, adverse effects to these PCEs. Use of heavy equipment causes soil disturbance and compaction that may negatively affect vernal pool hydrology, which could also negatively affect vernal pools, especially if earth-moving/regrading is necessary. However, extensive restoration projects involving regrading and other ground disturbing actions are likely to occur in areas that do not already contain highly functioning vernal pool or wetland complexes. The anticipated adverse effects will occur at the local, site-specific scale and are likely to be short-term in nature with likely long-term benefits to covered vernal pool Branchiopoda, native habitats and vernal pool complexes. Thus, these adverse effects will not be significant when evaluated at larger scales.

In the long-term, habitat manipulation, restoration, and enhancement activities will have beneficial effects on vernal pool complexes, resulting in an increase in abundance of the PCEs of critical habitat for this species. While there may be short-term adverse effects to PCEs of critical habitat for the fairy shrimp, the combination of the eligibility requirements, prohibited actions, and protection measures have been designed to substantially minimize or eliminate these effects. The following prohibited acts further minimize impacts to conservancy fairy shrimp critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

Each project is intended to benefit native habitats, and the size and extent of a typical restoration project is small relative to the overall size and extent of designated critical habitat. Thus, the long-term effects of the proposed activities are not likely to diminish the values of critical habitat for the purpose for which it was designated. Thus, the proposed activities will not destroy or adversely modify the PCEs of critical habitats for conservancy fairy shrimp.

3.4.2.6.3.2. Longhorn fairy shrimp and its critical habitat

Longhorn fairy shrimp

Longhorn fairy shrimp are extremely rare and are known from only a small number of widely separated populations in San Luis Obispo, Merced, Alameda, Contra Costa, and Fresno Counties in California. More information is provided in Appendix C. Longhorn fairy shrimp are most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The recovery strategy for the longhorn fairy shrimp includes restoring vernal pool habitat to promote the recovery of listed species and the long-term conservation of the species of concern (USFWS 2005b). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Thus, the proposed action allows the 10% temporary habitat loss self-imposed take limit to be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS Field Office, via the ESA Section 7(a)(2) Review Form process. In such cases, the USFWS Field Office will work with the Project Proponent to identify project specific vernal pool species protection measures in order to minimize impacts during the restoration project. Although such projects wouldn't be common among all the proposed restoration projects in a given year, they would result in the most adverse effects to covered vernal pool Branchiopoda and plants. However, restoring the vernal pool ecosystem will benefit these same species in the long-term.

Proposed restoration activities in and around vernal pool complexes will likely negatively affect fairy shrimp species and their habitats. Restoration actions will be designed to maintain or improve habitat for covered vernal pool plant and animal species, and in some instances may be necessary to maintain habitat suitability for fairy shrimp. Multiple measures are proposed to avoid and minimize impacts to fairy shrimp and include the General Protection Measures, Vernal Pool Branchiopoda Protection Measures, prohibited activities, and the self-imposed take limit provided in the project description of this PBO that limits impacts to no more than 10% temporary habitat loss per occupied pool (except for those projects where the sole purpose is to restore vernal pool ecological function). As described earlier, a net loss of vernal pool habitat is a prohibited act and not covered by this PBO. Implementation of some of these restoration activities may result in some adverse effects to individual fairy shrimp; however, we anticipate these effects will be short term in nature, localized to the project site, and not detectable at the population level. We cannot calculate the number of shrimp or eggs that might be killed or injured by incidental exposure to herbicides or other restoration actions but expect the actual

effect to be low given the numerous proposed protection measures. These short-term adverse effects will be small and of limited duration, and are necessary to achieve long-term, beneficial effects to fairy shrimp and vernal pool habitats that support this species. Most impacts to fairy shrimp resulting from these activities are expected to be insignificant, but there some will be harmed or killed. Thus, these activities may affect, and are likely to adversely affect fairy shrimp.

Given all the protection measures to minimize the number of longhorn fairy shrimp adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

Longhorn fairy shrimp critical habitat occurs in three units within California. More information is provided in Appendix C. Within these areas, the primary constituent elements for the Longhorn fairy shrimp consist of four components: PCE-1) Topographic features characterized by mounds and swales and depressions with flowing surface water in the swales connecting the pools; PCE-2) Depressional features that become inundated during winter rains; PCE-3) Sources of food; and PCE-4) Structure within the pools consisting of organic and inorganic materials.

Restoration in vernal pool complexes may alter soil and hydrologic conditions, resulting in short-term, adverse effects to these PCEs. Use of heavy equipment causes soil disturbance and compaction that may negatively affect vernal pool hydrology, which could also negatively affect vernal pools, especially if earth-moving/regrading is necessary. However, extensive restoration projects involving regrading and other ground disturbing actions are likely to occur in areas that do not already contain highly functioning vernal pool or wetland complexes. The anticipated adverse effects will occur at the local, site-specific scale and are likely to be short-term in nature with likely long-term benefits to covered vernal pool Branchiopoda, native habitats and vernal pool complexes. Thus, these adverse effects will not be significant when evaluated at larger scales.

In the long-term, habitat manipulation, restoration, and enhancement activities will have beneficial effects on vernal pool complexes, resulting in an increase in abundance of the PCEs of critical habitat for this species. While there may be short-term adverse effects to PCEs of critical habitat for the fairy shrimp, the combination of the eligibility requirements, prohibited actions, and protection measures have been designed to substantially minimize or eliminate these effects. The following prohibited acts further minimize impacts to conservancy fairy shrimp critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the

species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

Each project is intended to benefit native habitats, and the size and extent of a typical restoration project is small relative to the overall size and extent of designated critical habitat. Thus, the long-term effects of the proposed activities are not likely to diminish the values of critical habitat for the purpose for which it was designated. Thus, the proposed activities will not destroy or adversely modify the PCEs of critical habitats for longhorn fairy shrimp.

3.4.2.6.3.3. Riverside fairy shrimp and its critical habitat

Riverside fairy shrimp

As provided in more detail in Appendix C, the Riverside fairy shrimp occurs in the inland areas of Riverside County, Orange County, and the vicinity of Ramona, San Diego County, and coastal areas of San Diego County, California and northwestern Baja California, Mexico. Riverside fairy shrimp are most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The recovery strategy for the Riverside fairy shrimp includes enhancing or restoring habitat conditions in such a way that population levels of existing species are stabilized or increased (USFWS 1998c). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Thus, the proposed action allows the 10% temporary habitat loss self-imposed take limit to be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS Field Office, via the ESA Section 7(a)(2) Review Form process. In such cases, the USFWS Field Office will work with the Project Proponent to identify project specific vernal pool species protection measures in order to minimize impacts during the restoration project. Although such projects wouldn't be common among all the proposed restoration projects in a given year, they would result in the most adverse effects to covered vernal pool Branchiopoda and plants. However, restoring the vernal pool ecosystem will benefit these same species in the long-term. Proposed restoration activities in and around vernal pool complexes will likely negatively affect fairy shrimp species and their habitats. Restoration actions will be designed to maintain or improve habitat for covered vernal pool plant and animal species, and in some instances may be necessary to maintain habitat suitability for fairy shrimp. Multiple measures are proposed to avoid and minimize impacts to fairy shrimp and include the General Protection Measures, Vernal Pool Branchiopoda Protection Measures, prohibited activities, and the self-imposed take limit provided in the project description of this PBO that limits impacts to no more than 10% temporary habitat loss per occupied pool (except for those projects where the sole purpose is to restore vernal pool ecological function). As described earlier, a net loss of vernal pool habitat is a prohibited act and not covered by this PBO. Implementation of some of these restoration activities may result in some adverse effects to individual fairy shrimp; however, we anticipate

these effects will be short term in nature, localized to the project site, and not detectable at the population level. We cannot calculate the number of shrimp or eggs that might be killed or injured by incidental exposure to herbicides or other restoration actions but expect the actual effect to be low given the numerous proposed protection measures. These short-term adverse effects will be small and of limited duration, and are necessary to achieve long-term, beneficial effects to fairy shrimp and vernal pool habitats that support this species. Most impacts to fairy shrimp resulting from these activities are expected to be insignificant, but some will be harmed or killed. Thus, these activities may affect, and are likely to adversely affect fairy shrimp.

Given all the protection measures to minimize the number of Riverside fairy shrimp adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, Riverside fairy shrimp critical habitat has three units located in Ventura County, Los Angeles Basin-Orange County Foothills, and San Diego Southern Coastal Mesas. Within these areas, the primary constituent elements for the Riverside fairy shrimp consist of three components: PCE-1) Ephemeral wetland habitat consisting of vernal pools and ephemeral habitat that have wet and dry periods such that pools provide sufficient lengths of time necessary for incubation, maturation, and reproduction, in all but the driest years; PCE-2) Intermixed wetland and upland habitats that function as the local watershed, including topographic features characterized by mounds and swales and depressions with flowing surface water in the swales connecting the pools; and PCE-3) Soils that support ponding during winter and spring with a clay component or other property that creates an impermeable surface or subsurface layer.

Restoration in vernal pool complexes may alter soil and hydrologic conditions, resulting in short-term, adverse effects to these PCEs. Use of heavy equipment causes soil disturbance and compaction that will likely negatively affect vernal pool hydrology, which could also negatively affect vernal pools, especially if earth-moving/regrading is necessary. However, extensive restoration projects involving regrading and other ground disturbing actions are likely to occur in areas that do not already contain highly functioning vernal pool or wetland complexes. The anticipated adverse effects will occur at the local, site-specific scale and are likely to be short-term in nature with likely long-term benefits to covered vernal pool Branchiopoda, native habitats and vernal pool complexes. Thus, these adverse effects will not be significant when evaluated at larger scales.

In the long-term, habitat manipulation, restoration, and enhancement activities will have beneficial effects on vernal pool complexes, resulting in an increase in abundance of the PCEs of critical habitat for this species. While there may be short-term adverse effects to PCEs of critical habitat for the fairy shrimp, the combination of the eligibility requirements, prohibited actions, and protection measures have been designed to substantially minimize or eliminate these effects.

The following prohibited acts further minimize impacts to conservancy fairy shrimp critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

Each project is intended to benefit native habitats, and the size and extent of a typical restoration project is small relative to the overall size and extent of designated critical habitat. Thus, the long-term effects of the proposed activities are not likely to diminish the values of critical habitat for the purpose for which it was designated. Thus, the proposed activities will not destroy or adversely modify the PCEs of critical habitats for Riverside fairy shrimp.

3.4.2.6.3.4. San Diego fairy shrimp and its critical habitat

San Diego fairy shrimp

San Diego fairy shrimp are known to occur in San Diego County, the Los Angeles Basin-Orange County and a more recent population in Riverside County, California (USFWS 2021c). More information is provided in Appendix C. San Diego fairy shrimp are most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The recovery strategy for the San Diego fairy shrimp includes enhancing or restoring habitat conditions in such a way that population levels of existing species are stabilized or increased (USFWS 1998c). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Thus, the proposed action allows the 10% temporary habitat loss self-imposed take limit to be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS Field Office, via the ESA Section 7(a)(2) Review Form process. In such cases, the USFWS Field Office will work with the Project Proponent to identify project specific vernal pool species protection measures in order to minimize impacts during the restoration project. Although such projects wouldn't be common among all the proposed restoration projects in a given year, they would result in the most adverse effects to covered vernal pool Branchiopoda and plants. However, restoring the vernal pool ecosystem will benefit these same species in the long-term. Proposed restoration activities in and around vernal pool complexes will likely negatively affect fairy shrimp species and their habitats. Restoration actions will be designed to maintain or improve habitat for covered vernal pool plant and animal species, and in some instances may be necessary to maintain habitat suitability for fairy shrimp. Multiple measures are proposed to avoid and minimize impacts to fairy shrimp and include the General Protection Measures, Vernal Pool Branchiopoda Protection Measures, prohibited activities, and the self-imposed take limit

provided in the project description of this PBO that limits impacts to no more than 10% temporary habitat loss per occupied pool (except for those projects where the sole purpose is to restore vernal pool ecological function). As described earlier, a net loss of vernal pool habitat is a prohibited act and not covered by this PBO. Implementation of some of these restoration activities may result in some adverse effects to individual fairy shrimp; however, we anticipate these effects will be short term in nature, localized to the project site, and not detectable at the population level. We cannot calculate the number of shrimp or eggs that might be killed or injured by incidental exposure to herbicides or other restoration actions but expect the actual effect to be low given the numerous proposed protection measures. These short-term adverse effects will be small and of limited duration, and are necessary to achieve long-term, beneficial effects to fairy shrimp and vernal pool habitats that support this species. Most impacts to fairy shrimp resulting from these activities are expected to be insignificant, but there some will be harmed or killed. Thus, these activities may affect, and are likely to adversely affect fairy shrimp.

Given all the protection measures to minimize the number of San Diego fairy shrimp adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, San Diego fairy shrimp critical habitat has 5 units which occur in Orange and San Diego County, California. Within these areas, the primary constituent elements for the San Diego fairy shrimp consist of the three components summarized here: PCE-1) Vernal pools with shallow to moderate depths that hold water for sufficient lengths of time necessary for incubation, maturation, and reproduction of the San Diego fairy shrimp, in all but the driest years; PCE-2) Topographic features characterized by mounds and swales and depressions with flowing surface water in the swales connecting the pools; and PCE-3) Flat to gently sloping topography, and any soil type with a clay component and/or an impermeable surface or subsurface layer known to support vernal pool habitat.

Restoration in vernal pool complexes may alter soil and hydrologic conditions, resulting in short-term, adverse effects to these PCEs. Use of heavy equipment causes soil disturbance and compaction that can negatively affect vernal pool hydrology, which could also negatively affect vernal pools, especially if earth-moving/regrading is necessary. However, extensive restoration projects involving regrading and other ground disturbing actions are likely to occur in areas that do not already contain highly functioning vernal pool or wetland complexes. The anticipated adverse effects will occur at the local, site-specific scale and are likely to be short-term in nature with likely long-term benefits to covered vernal pool Branchiopoda, native habitats and vernal pool complexes. Thus, these adverse effects will not be significant when evaluated at larger scales.

In the long-term, habitat manipulation, restoration, and enhancement activities will have beneficial effects on vernal pool complexes, resulting in an increase in abundance of the PCEs of critical habitat for this species. While there may be short-term adverse effects to PCEs of critical habitat for the fairy shrimp, the combination of the eligibility requirements, prohibited actions, and protection measures have been designed to substantially minimize or eliminate these effects. The following prohibited acts further minimize impacts to conservancy fairy shrimp critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

Each project is intended to benefit native habitats, and the size and extent of a typical restoration project is small relative to the overall size and extent of designated critical habitat. Thus, the long-term effects of the proposed activities are not likely to diminish the values of critical habitat for the purpose for which it was designated. Thus, the proposed activities will not destroy or adversely modify the PCEs of critical habitats for San Diego fairy shrimp.

3.4.2.6.3.5. Vernal pool fairy shrimp and its critical habitat

Vernal pool fairy shrimp

As provided in more detail in Appendix C, the vernal pool fairy shrimp is found in 28 counties across the Central Valley and coast ranges of California and in Jackson County in southern Oregon. The species occupies a variety of vernal pool habitats and occurs in 11 of the 17 vernal pool regions and 45 of the 85 core recovery areas identified in California (USFWS 2005b). Vernal pool fairy shrimp are most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The recovery strategy for the vernal pool fairy shrimp includes restoring vernal pool habitat to promote the recovery of listed species and the long-term conservation of the species of concern (USFWS 2005b). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Thus, the proposed action allows the 10% temporary habitat loss self-imposed take limit to be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS Field Office, via the ESA Section 7(a)(2) Review Form process. In such cases, the USFWS Field Office will work with the Project Proponent to identify project specific vernal pool species protection measures in

order to minimize impacts during the restoration project. Although such projects wouldn't be common among all the proposed restoration projects in a given year, they would result in the most adverse effects to covered vernal pool Branchiopoda and plants. However, restoring the vernal pool ecosystem will benefit these same species in the long-term. Proposed restoration activities in and around vernal pool complexes will likely negatively affect fairy shrimp species and their habitats. Restoration actions will be designed to maintain or improve habitat for covered vernal pool plant and animal species, and in some instances may be necessary to maintain habitat suitability for fairy shrimp. Multiple measures are proposed to avoid and minimize impacts to fairy shrimp and include the General Protection Measures, Vernal Pool Branchiopoda Protection Measures, prohibited activities, and the self-imposed take limit provided in the project description of this PBO that limits impacts to no more than 10% temporary habitat loss per occupied pool (except for those projects where the sole purpose is to restore vernal pool ecological function). As described earlier, a net loss of vernal pool habitat is a prohibited act and not covered by this PBO. Implementation of some of these restoration activities may result in some adverse effects to individual fairy shrimp; however, we anticipate these effects will be short term in nature, localized to the project site, and not detectable at the population level. We cannot calculate the number of shrimp or eggs that might be killed or injured by incidental exposure to herbicides or other restoration actions but expect the actual effect to be low given the numerous proposed protection measures. These short-term adverse effects will be small and of limited duration, and are necessary to achieve long-term, beneficial effects to fairy shrimp and vernal pool habitats that support this species. Most impacts to fairy shrimp resulting from these activities are expected to be insignificant, but there some will be harmed or killed. Thus, these activities may affect, and are likely to adversely affect fairy shrimp.

Given all the protection measures to minimize the number of vernal pool fairy shrimp adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, vernal pool fairy shrimp critical habitat occurs in 35 units within California (more information is provided in Appendix C). Within these areas, the primary constituent elements for the vernal pool fairy shrimp consist of four components: PCE-1) Topographic features characterized by mounds and swales and depressions with flowing surface water in the swales connecting the pools; PCE-2) Depressional features that become inundated during winter rains; PCE-3) Sources of food; and PCE-4) Structure within the pools consisting of organic and inorganic materials.

Restoration in vernal pool complexes may alter soil and hydrologic conditions, resulting in short-term, adverse effects to these PCEs. Use of heavy equipment causes soil disturbance and compaction that will likely negatively affect vernal pool hydrology, which could also negatively

affect vernal pools, especially if earth-moving/regrading is necessary. However, extensive restoration projects involving regrading and other ground disturbing actions are likely to occur in areas that do not already contain highly functioning vernal pool or wetland complexes. The anticipated adverse effects will occur at the local, site-specific scale and are likely to be short-term in nature with likely long-term benefits to covered vernal pool Branchiopoda, native habitats and vernal pool complexes. Thus, these adverse effects will not be significant when evaluated at larger scales.

In the long-term, habitat manipulation, restoration, and enhancement activities will have beneficial effects on vernal pool complexes, resulting in an increase in abundance of the PCEs of critical habitat for this species. While there may be short-term adverse effects to PCEs of critical habitat for the fairy shrimp, the combination of the eligibility requirements, prohibited actions, and protection measures have been designed to substantially minimize or eliminate these effects. The following prohibited acts further minimize impacts to conservancy fairy shrimp critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

Each project is intended to benefit native habitats, and the size and extent of a typical restoration project is small relative to the overall size and extent of designated critical habitat. Thus, the long-term effects of the proposed activities are not likely to diminish the values of critical habitat for the purpose for which it was designated. Thus, the proposed activities will not destroy or adversely modify the PCEs of critical habitats for vernal pool fairy shrimp.

3.4.2.6.3.6. Vernal pool tadpole shrimp and its critical habitat

Vernal pool tadpole shrimp

As provided in more detail in Appendix C, the vernal pool tadpole shrimp are unique among the covered vernal pool animal species in that they have a hard shell that is large, flattened, and arched over the back of the tadpole shrimp in a shield-like manner. They are known as living fossils because they have changed little in appearance over roughly the last 2 million years. The vernal pool tadpole shrimp is currently distributed across the Central Valley of California and in the San Francisco Bay Area. Vernal pool tadpole shrimp are uncommon even where vernal pool habitats occur (USFWS 2005b). Vernal pool tadpole shrimp are most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The recovery strategy for the vernal pool tadpole shrimp includes restoring vernal pool habitat to promote the recovery of listed species and the long-term conservation of the species of concern (USFWS 2005b). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Thus, the proposed action allows the 10% temporary habitat loss self-imposed take limit to be exceeded for those projects where the sole purpose of the impact is to restore ecological function to the vernal pool, with agreement of the respective USFWS Field Office, via the ESA Section 7(a)(2) Review Form process. In such cases, the USFWS Field Office will work with the Project Proponent to identify project specific vernal pool species protection measures in order to minimize impacts during the restoration project. Although such projects wouldn't be common among all the proposed restoration projects in a given year, they would result in the most adverse effects to covered vernal pool Branchiopoda and plants. However, restoring the vernal pool ecosystem will benefit these same species in the long-term. Proposed restoration activities in and around vernal pool complexes will likely negatively affect vernal pool tadpole shrimp species and their habitats. Restoration actions will be designed to maintain or improve habitat for covered vernal pool plant and animal species, and in some instances may be necessary to maintain habitat suitability for vernal pool tadpole shrimp. Multiple measures are proposed to avoid and minimize impacts to vernal pool tadpole shrimp and include the General Protection Measures, Vernal Pool Branchiopoda Protection Measures, prohibited activities, and the self-imposed take limit provided in the project description of this PBO that limits impacts to no more than 10% temporary habitat loss per occupied pool (except for those projects where the sole purpose is to restore vernal pool ecological function). As described earlier, a net loss of vernal pool habitat is a prohibited act and not covered by this PBO. Implementation of some of these restoration activities may result in some adverse effects to individual vernal pool tadpole shrimp; however, we anticipate these effects will be short term in nature, localized to the project site, and not detectable at the population level. We cannot calculate the number of shrimp or eggs that might be killed or injured by incidental exposure to herbicides or other restoration actions but expect the actual effect to be low given the numerous proposed protection measures. These short-term adverse effects will be small and of limited duration, and are necessary to achieve long-term, beneficial effects to fairy shrimp and vernal pool habitats that support this species. Most impacts to vernal pool tadpole shrimp resulting from these activities are expected to be insignificant, but there some will be harmed or killed. Thus, these activities may affect, and are likely to adversely affect vernal pool tadpole shrimp.

Given all the protection measures to minimize the number of vernal pool tadpole shrimp adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with recovery plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, vernal pool tadpole shrimp critical habitat occurs in 18 units within California (more information is provided in Appendix C). Within these areas, the primary

constituent elements for the vernal pool tadpole shrimp consist of four components: PCE-1) Topographic features characterized by mounds and swales and depressions with flowing surface water in the swales connecting the pools; PCE-2) Depressional features that become inundated during winter rains; PCE-3) Sources of food; and PCE-4) Structure within the pools consisting of organic and inorganic materials.

Restoration in vernal pool complexes may alter soil and hydrologic conditions, resulting in short-term, adverse effects to these PCEs. Use of heavy equipment causes soil disturbance and compaction that can negatively affect vernal pool hydrology, which could also negatively affect vernal pools, especially if earth-moving/regrading is necessary. However, extensive restoration projects involving regrading and other ground disturbing actions are likely to occur in areas that do not already contain highly functioning vernal pool or wetland complexes. The anticipated adverse effects will occur at the local, site-specific scale and are likely to be short-term in nature with likely long-term benefits to covered vernal pool Branchiopoda, native habitats and vernal pool complexes. Thus, these adverse effects will not be significant when evaluated at larger scales.

In the long-term, habitat manipulation, restoration, and enhancement activities will have beneficial effects on vernal pool complexes, resulting in an increase in abundance of the PCEs of critical habitat for this species. While there may be short-term adverse effects to PCEs of critical habitat for the vernal pool tadpole shrimp, the combination of the eligibility requirements, prohibited actions, and protection measures have been designed to substantially minimize or eliminate these effects. The following prohibited acts further minimize impacts to conservancy vernal pool tadpole shrimp critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

Each project is intended to benefit native habitats, and the size and extent of a typical restoration project is small relative to the overall size and extent of designated critical habitat. Thus, the long-term effects of the proposed activities are not likely to diminish the values of critical habitat for the purpose for which it was designated. Thus, the proposed activities will not destroy or adversely modify the PCEs of critical habitats for vernal pool tadpole shrimp.

3.4.2.6.4. Vernal Pool Plant Species-Specific Analyses

3.4.2.6.4.1. Butte County meadowfoam and its critical habitat

Butte County meadowfoam

Butte County meadowfoam occurs in three types of seasonal wetlands: ephemeral drainages, vernal pool depressions in ephemeral drainages, and occasionally around the edges of isolated

vernal pools in Butte County, California (see Appendix C). Butte County meadowfoam is most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered vernal pool plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Protection Measures and General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of Butte County meadowfoam adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term), the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, Butte County meadowfoam critical habitat occurs in four units in Tehama and Butte Counties, California. Within these areas, the primary constituent elements for Butte County meadowfoam consist of the following summarized two components: PCE-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; and PCE-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.

Restoration activities most likely to affect the PCEs of Butte County meadowfoam critical habitat include techniques used for vernal pool restoration (mowing, herbicide use, burning, or grazing and plant propagation) and wetland restoration (regrading, etc.). Restoration in Butte County meadowfoam habitat, including vernal pool complexes, may alter soil and hydrologic conditions, resulting in short-term, adverse effects to these PCEs. Use of heavy equipment causes soil disturbance and compaction that can negatively affect vernal pool hydrology, which could also negatively affect vernal pools, especially if earth-moving/regrading is necessary. However, extensive restoration projects involving regrading and other ground disturbing actions are likely to occur in areas that do not already contain highly functioning vernal pool or wetland complexes. The anticipated adverse effects will occur at the local, site-specific scale and are likely to be short-term in nature with likely long-term benefits to covered vernal pool plant species, native habitats and vernal pool complexes. Thus, these adverse effects will not be significant when evaluated at larger scales.

In the long-term, habitat manipulation, restoration, and enhancement activities will have beneficial effects on habitat quality for Butte County meadowfoam, including vernal pool

complexes, resulting in an increase in abundance of the PCEs of critical habitat for this species. While there may be short-term adverse effects to PCEs of critical habitat for the Butte County meadowfoam, the combination of the eligibility requirements, prohibited actions, and protection measures have been designed to substantially minimize or eliminate these effects. The following prohibited acts further minimize impacts to Butte County meadowfoam critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

Each project is intended to benefit native habitats, and the size and extent of a typical restoration project is small relative to the overall size and extent of designated critical habitat. Thus, the long-term effects of the proposed activities are not likely to diminish the values of critical habitat for the purpose for which it was designated. Thus, the proposed activities will not destroy or adversely modify the PCEs of critical habitats for Butte County meadowfoam.

3.4.2.6.4.1.1. California Orcutt grass

California Orcutt grass occurs in vernal pool habitat in Ventura, Los Angeles, Riverside and San Diego County, California (see Appendix C). California Orcutt grass is most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for California Orcutt grass recommends the reestablishment, rehabilitation, and enhancement of vernal pool habitat to historic structure and composition to increase genetic diversity and population stability (USFWS 1998c). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered vernal pool Branchiopoda and plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of California Orcutt grass adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.6.4.2. Contra costa goldfields and its critical habitat

Contra costa goldfields

Contra Costa goldfields occurs in vernal pool and alkali playa habitat in ten counties within California: Alameda, Contra Costa, Marin, Mendocino, Monterey, Napa, Santa Barbara, Santa Clara, Solano, and Sonoma. It typically grows in vernal pools, swales, and low depressions in open valley and foothill grasslands (see Appendix C). Contra costa goldfields is most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for Contra Costa goldfields, recommends the restoration of vernal pool habitat to promote the recovery of listed species and the long-term conservation of the species of concern (USFWS 2005b). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered vernal pool Branchiopoda and plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Protection Measures and General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of Contra Costa goldfields adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, Contra Costa goldfields critical habitat occurs in eight units in Alameda, Contra Costa, Mendocino, Napa, and Solano Counties, California. Within these areas, the primary constituent elements for Contra Costa goldfields consist of the following summarized two components: PCE-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 PCE-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.

Restoration activities most likely to affect the PCEs of Contra Costa goldfields critical habitat include techniques used for vernal pool restoration (mowing, herbicide use, burning, or grazing and plant propagation) and wetland restoration (regrading, etc.). Restoration in Contra Costa goldfields habitat, including vernal pool complexes, may alter soil and hydrologic conditions, resulting in short-term, adverse effects to these PCEs. Use of heavy equipment causes soil disturbance and compaction that can negatively affect vernal pool hydrology, which could also

negatively affect vernal pools, especially if earth-moving/regrading is necessary. However, extensive restoration projects involving regrading and other ground disturbing actions are likely to occur in areas that do not already contain highly functioning vernal pool or wetland complexes. The anticipated adverse effects will occur at the local, site-specific scale and are likely to be short-term in nature with likely long-term benefits to covered vernal pool plant species, native habitats and vernal pool complexes. Thus, these adverse effects will not be significant when evaluated at larger scales.

In the long-term, habitat manipulation, restoration, and enhancement activities will have beneficial effects on habitat quality for Contra Costa goldfields, including vernal pool complexes, resulting in an increase in abundance of the PCEs of critical habitat for this species. While there may be short-term adverse effects to PCEs of critical habitat for Contra Costa goldfields, the combination of the eligibility requirements, prohibited actions, and protection measures have been designed to substantially minimize or eliminate these effects. The following prohibited acts further minimize impacts to Contra Costa goldfields critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

Each project is intended to benefit native habitats, and the size and extent of a typical restoration project is small relative to the overall size and extent of designated critical habitat. Thus, the long-term effects of the proposed activities are not likely to diminish the values of critical habitat for the purpose for which it was designated. Thus, the proposed activities will not destroy or adversely modify the PCEs of critical habitats for Contra Costa goldfields.

3.4.2.6.4.3. Few-flowered navarretia

Few-flowered navarretia is found in margins of vernal pools and lakes with a volcanic ash substrate, and wet ground in forest openings. This species is found only on substrates of volcanic origin and is dependent on vernal pools, vernal lakes, and swales for survival (see Appendix C). Few-flowered navarretia is most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for few-flowered navarretia recommends the restoration of vernal pool habitat to promote the recovery of listed species and the long-term conservation of the species of concern (USFWS 2005b). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered

vernal pool Branchiopoda and plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Protection Measures and General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of few-flowered navarretia adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.6.4.4. Few-flowered navarretia

Fleshy owl's-clover

Fleshy owl's-clover occurs primarily in vernal pools along the lower rolling foothill grasslands in the eastern San Joaquin Valley of the Southern Sierra Foothills Vernal Pool Region of California (see Appendix C). Fleshy owl's-clover is most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for fleshy owl's-clover recommends the restoration of vernal pool habitat to promote the recovery of listed species and the long-term conservation of the species of concern (USFWS 2005b). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered vernal pool Branchiopoda and plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Protection Measures and General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of fleshy owl's-clover adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, fleshy owl's-clover critical habitat occurs in six units in Fresno, Madera, Mariposa, Merced, San Joaquin, Stanislaus, and Tuolumne Counties, California. Within these areas, the primary constituent elements for fleshy owl's-clover consist of the following summarized two components: PCE-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 PCE-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.

Restoration activities most likely to affect the PCEs of fleshy owl's-clover critical habitat include techniques used for vernal pool restoration (mowing, herbicide use, burning, or grazing and plant propagation) and wetland restoration (regrading, etc.). Restoration in fleshy owl's-clover habitat, including vernal pool complexes, may alter soil and hydrologic conditions, resulting in short-term, adverse effects to these PCEs. Use of heavy equipment causes soil disturbance and compaction that can negatively affect vernal pool hydrology, which could also negatively affect vernal pools, especially if earth-moving/regrading is necessary. However, extensive restoration projects involving regrading and other ground disturbing actions are likely to occur in areas that do not already contain highly functioning vernal pool or wetland complexes. The anticipated adverse effects will occur at the local, site-specific scale and are likely to be short-term in nature with likely long-term benefits to covered vernal pool plant species, native habitats and vernal pool complexes. Thus, these adverse effects will not be significant when evaluated at larger scales.

In the long-term, habitat manipulation, restoration, and enhancement activities will have beneficial effects on habitat quality for fleshy owl's-clover, including vernal pool complexes, resulting in an increase in abundance of the PCEs of critical habitat for this species. While there may be short-term adverse effects to PCEs of critical habitat for the fleshy owl's-clover, the combination of the eligibility requirements, prohibited actions, and protection measures have been designed to substantially minimize or eliminate these effects. The following prohibited acts further minimize impacts to fleshy owl's-clover critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

Each project is intended to benefit native habitats, and the size and extent of a typical restoration project is small relative to the overall size and extent of designated critical habitat. Thus, the long-term effects of the proposed activities are not likely to diminish the values of critical habitat for the purpose for which it was designated. Thus, the proposed activities will not destroy or adversely modify the PCEs of critical habitats for fleshy owl's-clover.

3.4.2.6.4.5. Hairy Orcutt grass and its critical habitat

Hairy Orcutt grass

Hairy Orcutt grass occurs in vernal pools on the eastern side of the Central Valley of California (see Appendix C). Hairy Orcutt grass is most likely to be affected by techniques used for vernal

pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for hairy Orcutt grass recommends the restoration of vernal pool habitat to promote the recovery of listed species and the long-term conservation of the species of concern (USFWS 2005b). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered vernal pool Branchiopoda and plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Protection Measures and General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of hairy Orcutt grass adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, hairy Orcutt grass critical habitat occurs in five units in Butte, Fresno, Madera, Mariposa, Merced, Stanislaus, and Tehama Counties, California. Within these areas, the primary constituent elements for hairy Orcutt grass consist of the following summarized two components: PCE-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 PCE-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.

Restoration activities most likely to affect the PCEs of hairy Orcutt grass critical habitat include techniques used for vernal pool restoration (mowing, herbicide use, burning, or grazing and plant propagation) and wetland restoration (regrading, etc.). Restoration in hairy Orcutt grass habitat, including vernal pool complexes, may alter soil and hydrologic conditions, resulting in short-term, adverse effects to these PCEs. Use of heavy equipment causes soil disturbance and compaction that can negatively affect vernal pool hydrology, which could also negatively affect vernal pools, especially if earth-moving/regrading is necessary. However, extensive restoration projects involving regrading and other ground disturbing actions are likely to occur in areas that do not already contain highly functioning vernal pool or wetland complexes. The anticipated adverse effects will occur at the local, site-specific scale and are likely to be short-term in nature with likely long-term benefits to covered vernal pool plant species, native habitats and vernal pool complexes. Thus, these adverse effects will not be significant when evaluated at larger scales.

In the long-term, habitat manipulation, restoration, and enhancement activities will have beneficial effects on habitat quality for hairy Orcutt grass, including vernal pool complexes, resulting in an increase in abundance of the PCEs of critical habitat for this species. While there may be short-term adverse effects to PCEs of critical habitat for the hairy Orcutt grass, the combination of the eligibility requirements, prohibited actions, and protection measures have been designed to substantially minimize or eliminate these effects. The following prohibited acts further minimize impacts to hairy Orcutt grass critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

Each project is intended to benefit native habitats, and the size and extent of a typical restoration project is small relative to the overall size and extent of designated critical habitat. Thus, the long-term effects of the proposed activities are not likely to diminish the values of critical habitat for the purpose for which it was designated. Thus, the proposed activities will not destroy or adversely modify the PCEs of critical habitats for hairy Orcutt grass.

3.4.2.6.4.6. Hoover's spurge and its critical habitat

Hoover's spurge

Hoover's spurge is restricted to vernal pools in the Northeastern Sacramento Valley Vernal Pool Region of California (see Appendix C). Hoover's spurge is most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for Hoover's spurge recommends the restoration of vernal pool habitat to promote the recovery of listed species and the long-term conservation of the species of concern (USFWS 2005b). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered vernal pool Branchiopoda and plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Protection Measures and General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of Hoover's spurge adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, Hoover's spurge critical habitat occurs in seven units in Merced, Stanislaus, Tehama, Tulare, and Tuolumne Counties, California. Within these areas, the primary constituent elements for Hoover's spurge consist of the following summarized two components: PCE-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 PCE-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.

Restoration activities most likely to affect the PCEs of Hoover's spurge critical habitat include techniques used for vernal pool restoration (mowing, herbicide use, burning, or grazing and plant propagation) and wetland restoration (regrading, etc.). Restoration in Hoover's spurge habitat, including vernal pool complexes, may alter soil and hydrologic conditions, resulting in short-term, adverse effects to these PCEs. Use of heavy equipment causes soil disturbance and compaction that can negatively affect vernal pool hydrology, which could also negatively affect vernal pools, especially if earth-moving/regrading is necessary. However, extensive restoration projects involving regrading and other ground disturbing actions are likely to occur in areas that do not already contain highly functioning vernal pool or wetland complexes. The anticipated adverse effects will occur at the local, site-specific scale and are likely to be short-term in nature with likely long-term benefits to covered vernal pool plant species, native habitats and vernal pool complexes. Thus, these adverse effects will not be significant when evaluated at larger scales.

In the long-term, habitat manipulation, restoration, and enhancement activities will have beneficial effects on habitat quality for Hoover's spurge, including vernal pool complexes, resulting in an increase in abundance of the PCEs of critical habitat for this species. While there may be short-term adverse effects to PCEs of critical habitat for the Hoover's spurge, the combination of the eligibility requirements, prohibited actions, and protection measures have been designed to substantially minimize or eliminate these effects. The following prohibited acts further minimize impacts to Hoover's spurge critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

Each project is intended to benefit native habitats, and the size and extent of a typical restoration project is small relative to the overall size and extent of designated critical habitat. Thus, the long-term effects of the proposed activities are not likely to diminish the values of critical habitat

for the purpose for which it was designated. Thus, the proposed activities will not destroy or adversely modify the PCEs of critical habitats for Hoover's spurge.

3.4.2.6.4.7. Otay Mesa-mint

Otay Mesa-mint is restricted to vernal pools in southern San Diego County, California (see Appendix C). Otay Mesa-mint is most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan that addresses Otay Mesa-mint recommends the reestablishment, rehabilitation, and enhancement of vernal pool habitat to historic structure and composition to increase genetic diversity and population stability (USFWS 1998c). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered vernal pool Branchiopoda and plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Protection Measures and General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of Otay Mesa-mint adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.6.4.8. Sacramento Orcutt grass

Sacramento Orcutt grass

Sacramento Orcutt grass has a small geographic range within Sacramento County and has specific soil requirements (see Appendix C). Sacramento Orcutt grass is most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for Sacramento Orcutt grass recommends the restoration of vernal pool habitat to promote the recovery of listed species and the long-term conservation of the species of concern (USFWS 2005b). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered vernal pool Branchiopoda and plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Protection Measures and General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of Sacramento Orcutt grass

adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, Sacramento Orcutt grass critical habitat occurs in three units in Sacramento and Amador County, California. Within these areas, the primary constituent elements for Sacramento Orcutt grass consist of the following summarized two components: PCE-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 PCE-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.

Restoration activities most likely to affect the PCEs of Sacramento Orcutt grass critical habitat include techniques used for vernal pool restoration (mowing, herbicide use, burning, or grazing and plant propagation) and wetland restoration (regrading, etc.). Restoration in Sacramento Orcutt grass habitat, including vernal pool complexes, may alter soil and hydrologic conditions, resulting in short-term, adverse effects to these PCEs. Use of heavy equipment causes soil disturbance and compaction that can negatively affect vernal pool hydrology, which could also negatively affect vernal pools, especially if earth-moving/regrading is necessary. However, extensive restoration projects involving regrading and other ground disturbing actions are likely to occur in areas that do not already contain highly functioning vernal pool or wetland complexes. The anticipated adverse effects will occur at the local, site-specific scale and are likely to be short-term in nature with likely long-term benefits to covered vernal pool plant species, native habitats and vernal pool complexes. Thus, these adverse effects will not be significant when evaluated at larger scales.

In the long-term, habitat manipulation, restoration, and enhancement activities will have beneficial effects on habitat quality for Sacramento Orcutt grass, including vernal pool complexes, resulting in an increase in abundance of the PCEs of critical habitat for this species. While there may be short-term adverse effects to PCEs of critical habitat for the Sacramento Orcutt grass, the combination of the eligibility requirements, prohibited actions, and protection measures have been designed to substantially minimize or eliminate these effects. The following prohibited acts further minimize impacts to Sacramento Orcutt grass critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and

conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

Each project is intended to benefit native habitats, and the size and extent of a typical restoration project is small relative to the overall size and extent of designated critical habitat. Thus, the long-term effects of the proposed activities are not likely to diminish the values of critical habitat for the purpose for which it was designated. Thus, the proposed activities will not destroy or adversely modify the PCEs of critical habitats for Sacramento Orcutt grass.

3.4.2.6.4.9. San Diego ambrosia and its critical habitat

San Diego Ambrosia

San Diego ambrosia occurs in southern California from northwestern Riverside County, south through western San Diego County, California to northwestern Baja California, Mexico. It is not only found in vernal pools, but also within coastal scrub, grasslands, and open floodplains (USFWS 2010a). More information is provided in Appendix C. San Diego ambrosia is most likely to be affected by techniques used for floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat; establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands; and establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites, including vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

There is no recovery plan for San Diego ambrosia, but the USFWS 5-Year Review recognizes the opportunities for habitat restoration and enhancement, including restoring vernal pool habitat to promote the recovery of listed species and the long-term conservation of the species of concern (USFWS 2010a). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered vernal pool Branchiopoda and plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Protection Measures and General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of San Diego ambrosia adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, San Diego ambrosia critical habitat occurs in 6 units in Riverside and San Diego Counties, California. Within these areas, the primary constituent elements for the

San Diego ambrosia consist of the following summarized two components: PCE-1) Sandy loam or clay soils that occur on or near a river, creek, or other drainage, or within the watershed of a vernal pool, and that occur on an upper terrace; and PCE-2) Grassland or ruderal habitat types that provide adequate sunlight, and airflow for wind pollination.

While the proposed action will have adverse effects to San Diego ambrosia critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following prohibited acts minimize impacts to San Diego ambrosia critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.6.4.10. San Diego button celery

San Diego button celery occurs in vernal pools in Riverside and San Diego County, California. It is a clay soil, surface and non-surface hard pan, vernal pool obligate (see Appendix C). San Diego button celery is most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for San Diego button celery recommends the reestablishment, rehabilitation, and enhancement of vernal pool habitat to historic structure and composition to increase genetic diversity and population stability (USFWS 1998c). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered vernal pool Branchiopoda and plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Protection Measures and General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of San Diego button celery adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.6.4.11. San Joaquin Orcutt grass and its critical habitat

San Joaquin Orcutt grass

San Joaquin Orcutt grass occurs in vernal pools in portions of Solano, Merced, Madera, Fresno, and Tulare Counties, California (see Appendix C). San Joaquin Orcutt grass is most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for San Joaquin Orcutt grass recommends the restoration of vernal pool habitat to promote the recovery of listed species and the long-term conservation of the species of concern (USFWS 2005b). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered vernal pool Branchiopoda and plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Protection Measures and General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of San Joaquin Orcutt grass adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, San Joaquin Orcutt grass critical habitat occurs in six units in Fresno, Madera, Mariposa, Merced, and Tulare Counties, California. Within these areas, the primary constituent elements for San Joaquin Orcutt grass consist of the following summarized two components: PCE-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 PCE-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.

Restoration activities most likely to affect the PCEs of San Joaquin Orcutt grass critical habitat include techniques used for vernal pool restoration (mowing, herbicide use, burning, or grazing and plant propagation) and wetland restoration (regrading, etc.). Restoration in San Joaquin Orcutt grass habitat, including vernal pool complexes, may alter soil and hydrologic conditions, resulting in short-term, adverse effects to these PCEs. Use of heavy equipment causes soil disturbance and compaction that can negatively affect vernal pool hydrology, which could also negatively affect vernal pools, especially if earth-moving/regrading is necessary. However, extensive restoration projects involving regrading and other ground disturbing actions are likely

to occur in areas that do not already contain highly functioning vernal pool or wetland complexes. The anticipated adverse effects will occur at the local, site-specific scale and are likely to be short-term in nature with likely long-term benefits to covered vernal pool plant species, native habitats and vernal pool complexes. Thus, these adverse effects will not be significant when evaluated at larger scales.

In the long-term, habitat manipulation, restoration, and enhancement activities will have beneficial effects on habitat quality for San Joaquin Orcutt grass, including vernal pool complexes, resulting in an increase in abundance of the PCEs of critical habitat for this species. While there may be short-term adverse effects to PCEs of critical habitat for the San Joaquin Orcutt grass, the combination of the eligibility requirements, prohibited actions, and protection measures have been designed to substantially minimize or eliminate these effects. The following prohibited acts further minimize impacts to San Joaquin Orcutt grass critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

Each project is intended to benefit native habitats, and the size and extent of a typical restoration project is small relative to the overall size and extent of designated critical habitat. Thus, the long-term effects of the proposed activities are not likely to diminish the values of critical habitat for the purpose for which it was designated. Thus, the proposed activities will not destroy or adversely modify the PCEs of critical habitats for San Joaquin Orcutt grass.

3.4.2.6.4.12. Slender Orcutt grass and its critical habitat

Slender Orcutt grass

Slender Orcutt grass occurs is endemic to California vernal pools. Disjunct occurrences of the species occur in vernal pools on remnant alluvial fans, high stream terraces, and recent basalt flows from the Modoc Plateau in northeastern California, west to Lake County, and south through the Central Valley to Sacramento County. It has also been found in other natural and artificial seasonal wetlands (see Appendix C). Slender Orcutt grass is most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for slender Orcutt grass recommends the restoration of vernal pool habitat to promote the recovery of listed species and the long-term conservation of the species of concern (USFWS 2005b). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered vernal pool

Branchiopoda and plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Protection Measures and General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of slender Orcutt grass adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, slender Orcutt grass critical habitat occurs in six units in Fresno, Madera, Mariposa, Merced, and Tulare Counties, California. Within these areas, the primary constituent elements for slender Orcutt grass consist of the following summarized two components: PCE-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 PCE-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.

Restoration activities most likely to affect the PCEs of slender Orcutt grass critical habitat include techniques used for vernal pool restoration (mowing, herbicide use, burning, or grazing and plant propagation) and wetland restoration (regrading, etc.). Restoration in slender Orcutt grass habitat, including vernal pool complexes, may alter soil and hydrologic conditions, resulting in short- term, adverse effects to these PCEs. Use of heavy equipment causes soil disturbance and compaction that can negatively affect vernal pool hydrology, which could also negatively affect vernal pools, especially if earth-moving/ regrading is necessary. However, extensive restoration projects involving regrading and other ground disturbing actions are likely to occur in areas that do not already contain highly functioning vernal pool or wetland complexes. The anticipated adverse effects will occur at the local, site-specific scale and are likely to be short-term in nature with likely long-term benefits to covered vernal pool plant species, native habitats and vernal pool complexes. Thus, these adverse effects will not be significant when evaluated at larger scales.

In the long-term, habitat manipulation, restoration, and enhancement activities will have beneficial effects on habitat quality for slender Orcutt grass, including vernal pool complexes, resulting in an increase in abundance of the PCEs of critical habitat for this species. While there may be short-term adverse effects to PCEs of critical habitat for the slender Orcutt grass, the combination of the eligibility requirements, prohibited actions, and protection measures have been designed to substantially minimize or eliminate these effects. The following prohibited acts further minimize impacts to slender Orcutt grass critical habitat function: 1) Projects that would

result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

Each project is intended to benefit native habitats, and the size and extent of a typical restoration project is small relative to the overall size and extent of designated critical habitat. Thus, the long-term effects of the proposed activities are not likely to diminish the values of critical habitat for the purpose for which it was designated. Thus, the proposed activities will not destroy or adversely modify the PCEs of critical habitats for slender Orcutt grass.

3.4.2.6.4.13. Spreading navarretia and its critical habitat

Spreading navarretia

Spreading navarretia occurs in vernal pool and alkali playa habitat in southern California, United States and Baja California, Mexico. It is dependent on the ephemeral inundation cycle found in vernal pool habitat and playas but may also occur in man-made depressions and ditches that have the same hydrological dynamics (See Appendix C). Spreading navarretia is most likely to be affected by techniques used for vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for spreading navarretia recommends the reestablishment, rehabilitation, and enhancement of vernal pool habitat to historic structure and composition to increase genetic diversity and population stability (USFWS 1998c). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered vernal pool Branchiopoda and plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Protection Measures and General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of spreading navarretia adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, spreading navarretia critical habitat occurs in six units in Los Angeles, Riverside, and San Diego Counties, California. Within these areas, the primary constituent elements for spreading navarretia consist of the following summarized three components: PCE-1) Ephemeral wetland habitat. Vernal pools and seasonally flooded alkali

vernal plains; PCE-2) Intermixed wetland and upland habitats that act as the local watershed; and PCE-3) Soils that support ponding during winter and spring. Soils that have a clay component or other property that creates an impermeable surface or subsurface layer.

While the proposed action will have adverse effects to spreading navarretia critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following prohibited acts minimize impacts to spreading navarretia critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.6.4.14. Thread-leaved brodiaea and its critical habitat

Thread-leaved brodiaea

Thread-leaved brodiaea occurs in Los Angeles, Orange, Riverside, San Bernardino and San Diego County, California. Thread-leaved brodiaea is not only found in vernal pools, but also occurs in herbaceous plant communities such as valley needlegrass grassland, valley sacaton grassland, nonnative grassland, and alkali playas (see Appendix C). Thread-leaved brodiaea is most likely to be affected by techniques used for floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat; establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands; and establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites, including vernal pool restoration. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

There is no recovery plan for thread-leaved brodiaea, but the USFWS 5-Year Review recommends seeking habitat restoration and enhancement opportunities for this species (USFWS 2009). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded vernal pool habitat condition is a common stressor to vernal pool plant and animal species. Most of the restoration activities that would adversely affect covered vernal pool Branchiopoda and plants are for the purpose of restoring the vernal pool ecosystem itself to benefit these same species in the long-term.

Given the General Protection Measures and General Plant Protection Measures (including Vernal Pool Plant Protection Measures) designed to minimize the number of thread-leaved brodiaea adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the no net loss of vernal pool habitat and the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in

the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, thread leaved brodiaea critical habitat occurs in Los Angeles, Orange, Riverside, San Bernardino, and San Diego County, California. Within these areas, the primary constituent elements for thread-leaved brodiaea consist of the following summarized two components: PCE-1) Appropriate soil series at a range of elevations and in a variety of plant communities; and PCE-2) Areas with a natural, generally intact surface and subsurface soil structure, not permanently altered by anthropogenic land use activities, extending out up to 820 ft from mapped occurrences of *Brodiaea filifolia* to provide for space for individual population growth, and space for pollinators.

While the proposed action will have adverse effects to thread-leaved brodiaea critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following prohibited acts minimize impacts to thread-leaved brodiaea critical habitat function: 1) Projects that would result in a net loss of vernal pool habitat; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.7. Fish Species

3.4.2.7.1. General

While the proposed restoration projects will cause some adverse effects to covered fish species as identified in the general effects section above, these effects are expected to be short-term and localized, and thus relatively minor to the fish populations. Because restoration actions will contribute to a lessening of many of the factors limiting the recovery of these species, particularly those factors related to fish passage, degraded floodplain connectivity, reduced aquatic habitat complexity and riparian conditions, and improve habitats above the degraded environmental baseline, (particularly at the site scale), we anticipate these projects will support the recovery of covered fish species in the long-term. Thus, while the proposed restoration activities will have site-specific effects, all proposed projects must result in a net increase in aquatic or riparian resource functions and/or services and be consistent with USFWS Recovery Plans or recovery-related documentation for Covered Species.

The general fish protection measures for avoiding and minimizing habitat (FISH-1), conducting habitat assessments and surveys (FISH-2), minimizing consequences from fish capture and

relocation (FISH-3), along with a reporting requirement (FISH-4), are intended to minimize the effects from restoration project implementation as described in the general effects section above. These protection measures are expected to greatly reduce the duration and extent of any adverse effects to individual fish or their habitats.

While some restoration activities, and resulting exposures, are likely to result in injury or mortality for individuals (up to the self-imposed take limits provided in the project description), we expect very few individual fish to be adversely affected per project. The eligibility requirements, prohibited actions, protection measures, and self-imposed take limits, combined, will minimize effects to covered fish species such that implementation of restoration actions are not expected to affect species abundance, productivity, distribution, or genetic diversity of any covered fish population within the Action Area. The USFWS expects that the number and productivity of any covered fish species will not be appreciably reduced or diminished across the ranges of each fish species. As the quality and quantity of habitat is improved, the long-term viability of local populations will likely be enhanced.

3.4.2.7.2. Herbicide Use

Although the herbicides proposed for use were selected due to their low to moderate toxicity, herbicide use for removal of invasive plant species could cause adverse effects to covered fish species.

Data on toxicity to wild fish under natural conditions are limited and most studies are conducted on lab specimens. Chronic studies or even long-term studies on fish egg and fry are seldom conducted. Additionally, in laboratory studies, test animals are exposed to only a single chemical. In the environment, humans and wildlife may be exposed to multiple toxicants simultaneously, which can lead to additive or synergistic effects.

Generally, effect threshold values for listed salmonids were lower than values for other fish species groups. In the case of sulfometuron-methyl, threshold values for fathead minnow were lower than salmonid values. Although it is worth noting that laboratory experiments do not typically account for species in their natural environments and little data is available from studies focused specifically on the Covered Species. This leads to uncertainty in risk assessment analyses. Environmental stressors increase the adverse effects of contaminants, but the degree to which these effects are likely to occur for various herbicides is largely unknown.

Although herbicides reaching surface waters will likely result in mortality to fish during incubation, or lead to altered development of embryos, Stehr et al. (2009) suggests the low levels of herbicide delivered to surface waters are unlikely to be toxic to the fish embryos. Stehr et al. (2009) studied developmental toxicity in zebrafish (*Danio rerio*), which involved conducting rapid and sensitive phenotypic screens for potential developmental defects resulting from exposure to six herbicides (picloram, clopyralid, imazapic, glyphosate, imazapyr, and triclopyr) and several technical formulations. Available evidence indicates that zebrafish embryos are reasonable and appropriate surrogates for embryos of other fish. The absence of detectable toxicity in zebrafish screens is unlikely to represent a false negative in terms of toxicity to early

developmental stages of threatened or endangered fish species. These findings do not necessarily extend to other life stages or other physiological processes (e.g., disease susceptibility, behavior); thus, reduced growth and development, decreased predator avoidance, or modified behavior remain adverse outcomes. In addition, herbicides are likely to also adversely affect the food base for listed salmonids and other fish, which includes terrestrial organisms of riparian origin, aquatic macroinvertebrates and forage fish.

The proposed protection measures will greatly reduce the likelihood that significant amounts of herbicide will be transported to aquatic habitats, although some herbicides are still likely to enter streams through aerial drift, in association with eroded sediment in runoff, and dissolved in runoff, including runoff from intermittent streams and ditches. Thus, adverse health effects (mortality and sublethal effects) from herbicide application to all life stages of covered fish species are likely; however, the general and specific protection measures described above will ensure herbicides are only used when and where necessary, minimize over exposure by ensuring herbicides are applied correctly and according to label, and reduce the risk of herbicide application on non-target species.

3.4.2.7.3. Species-Specific Analyses

3.4.2.7.3.1. Delta smelt and its critical habitat

Delta Smelt

As provided in more detail in Appendix C, delta smelt are unique in that they have a limited range (San Francisco Bay-Delta including areas further up in the Napa and Sacramento Rivers), a large majority only live one-year, natural numbers are extremely low, and in December 2021, captively produced delta smelt were experimentally released into the Sacramento-San Joaquin River Delta. The USFWS found up-listing delta smelt to endangered was warranted; however, because the delta smelt is already protected in the same way that it would be if it were listed as endangered, USFWS concludes that reclassification of the species is precluded by higher priority listing decisions. Delta smelt are most likely to be affected by techniques used for establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

Several marsh restoration projects, in various stages of implementation, in the north and south San Francisco Bay and in Suisun Marsh may increase habitat for delta smelt. The eligible project types covered in this PBO include various marsh restoration activities. However, due to other existing programmatic consultations in the San Francisco Bay area, including Suisun Bay, it is unclear how often this PBO may be used for such activities within delta smelt habitat.

In addition to the General Protection Measures and Fish Protection Measures, the Delta Smelt Protection Measure requires all in-water work occurring in waters potentially supporting Delta smelt to occur between August 1 and November 30th to avoid spawning which occurs mostly from February through May (DS-1). The self-imposed take limit provided in the project description of this PBO requires the local USFWS Field Office and Project Proponent work

together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area and allows no more than one individual injured or killed annually.

Given the limited number and distribution of Delta smelt, all the protection measures to minimize the number of Delta smelt adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Delta Smelt Critical Habitat

As provided in more detail in Appendix C, delta smelt critical habitat includes all water and all submerged lands below ordinary high water and the entire water column bounded by and contained in Suisun Bay (including the contiguous Grizzly and Honker Bays); the length of Goodyear, Suisun, Cutoff, First Mallard (Spring Branch), and Montezuma sloughs; and the existing contiguous waters contained within the legal Delta (as defined in section 12220 of the California Water Code) (USFWS 1994). The primary constituent elements considered essential to the conservation of the delta smelt are physical habitat, water, river flow, and salinity concentrations required to maintain delta smelt habitat for spawning, larval and juvenile transport, rearing, and adult migration (USFWS 1994).

While the proposed action will have adverse effects to Delta smelt critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, protection measures, and self-imposed take limits. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following prohibited acts ensure no net loss of habitat and critical habitat function: 1) Restoration projects that would result in a net loss of aquatic resource functions and/or services; and 2) Restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.7.3.2. Lahontan cutthroat trout

As provided in more detail in Appendix C, Lahontan cutthroat trout are unique in that they are the largest cutthroat trout species, evolved in the hydrographically isolated Lahontan Basin of northeastern California, southeastern Oregon, and northern Nevada, spawn in the spring, and can be harvested under a special 4(d) rule under the ESA that allows the states to permit angling. Lahontan cutthroat trout currently occupy about 15% of the remaining potentially suitable habitat

(LCT Coordinating Committee 2019), and they are raised at State, Tribal, and Federal hatcheries and stocked in California and Nevada for recovery and recreational fishing purposes.

In addition to the General Protection Measures and Fish Protection Measures, the Lahontan cutthroat trout Protection Measure requires all in-water work occurring in waters potentially supporting Lahontan cutthroat trout rearing and migration, but not spawning, to occur between July 1 and March 31. In-water work occurring in waters potentially supporting Lahontan cutthroat trout spawning will occur between October 1 and March 31 (LCT-1). The self-imposed take limit provided in the project description of this PBO requires no more than 20 NTUs 500 feet downstream of the project site or no more than 20% above background conditions, whichever is greater and allows no more than 3% of capture and relocations injured or killed annually.

Given the limited number and distribution of Lahontan cutthroat trout, all the protection measures to minimize the number of Lahontan cutthroat trout adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with recovery plan related documentation, and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.7.3.3. Tidewater goby and its critical habitat

Tidewater goby

As provided in more detail in Appendix C, tidewater goby 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). It is a short-lived species; the lifespan of most individuals appears to be about 1 year (Irwin and Soltz 1984, Swift et al. 1989). Overall, the population and range are currently stable, but the southernmost population of tidewater goby is not due to permanent loss of suitable habitat. The tidewater goby is most likely to be affected by techniques used for establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

In addition to the General Protection Measures and Fish Protection Measures, the tidewater goby Protection Measure provides specific requirements for capture and relocation of tidewater gobies to minimize impacts when relocation of gobies is needed, such as during dewatering activities. The self-imposed take limit provided in the project description of this PBO allows no more than 10% of the individuals captured and relocated at any individual project site to be injured or killed. A percentage was chosen to the high fluctuation of number of tidewater gobies at a particular location any given year.

Given all the protection measures to minimize the number of tidewater goby adversely affected by the proposed action, the eligibility criteria and prohibited acts, the requirement to be consistent with Recovery Plans, and the anticipated long-term benefits from each project to

native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in more detail in Appendix C, tidewater goby critical habitat 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. The Physical and Biological Features include 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 ppt, which provide adequate space for normal behavior and individual and population growth that contain one or more of appropriate substrate, vegetation, and sandbar(s) to provide stable water level and salinity.

While the proposed action will have adverse effects to tidewater goby critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following prohibited acts ensure no net loss of habitat and critical habitat function: 1) Restoration projects that would result in a net loss of aquatic resource functions and/or services; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.8. Non-vernal Pool Plant Species

3.4.2.8.1. General

All proposed restoration activities may negatively affect covered non-vernal pool plant species (directly or indirectly) due to the nature of the activity. The use of heavy equipment machinery and vehicles will likely crush plants or compact soil conditions such that plants are harmed or killed; similarly, restoration crews/workers may also inadvertently trample and crush plants or alter soils conditions such that plants are harmed or killed. Activities implemented near or within occupied habitats will have the greatest effects to these species. The General Plant Protection Measures (PLANT-1 through PLANT-8) include habitat assessments and surveys when all potentially occurring covered plants are identifiable, usually in the flowering, peak flowering, or fruiting stage, exclusion buffers; seasonal avoidance measures and biological monitoring and herbicide restrictions to minimize these negative effects. The anticipated long- term beneficial

effects to listed species are expected to negate any short-term effects by improving ecosystem function.

Ground disturbing activities (e.g., installation of structures and facilities, soil stabilization, grading, tilling, and habitat conversions, etc.) and the control or removal of invasive and non-native vegetation will have the most adverse effects to federally-listed non-vernal pool plant species. These activities will likely adversely affect all life stages of listed plants (i.e., seeds, seedlings, and reproductive plants). Covered non-vernal pool plant species will likely be trampled, broken, dug up, and killed; and soils compacted, displaced, or removed from the project site. However, the General Plant Protection Measures and species-specific protection measures will minimize these negative effects. Long-term beneficial effects are expected by addressing threats to listed species, such as degraded ecosystem processes, and non-vernal pool plant competition with non-native and invasive plant species.

Many of the listed plants addressed in this PBO occur in vernal pools, marshes or riparian areas. Thus, these plants may occur in or near sites where aquatic or wetland restoration projects occur. Many of these restoration projects are designed to improve natural conditions for rivers, streams or wetlands, which benefit the overall site characteristics for native and listed species. However, these actions may target benefits to listed fish, which may negatively impact covered non-vernal pool plant individuals if they are present. The Plant Protection Measures (such as surveys and buffers) will be applied and implemented as possible to minimize these impacts.

There may be circumstances in which listed plant individuals cannot be adequately buffered or avoided to meet the goals of the aquatic or wetland restoration action. Restoration actions may kill individual plants through regrading or other soil moving techniques or alter the hydrology of the site such that the habitat will no longer support the listed plant(s). Although we anticipate this situation to be uncommon, these plants may have to be dug up and removed from the site in order to achieve the restoration goals. In these situations, the Plant Protection Measures and the eligibility criteria must be met which prohibits:

- Projects that would result in a net loss of aquatic resource functions and/or services.
- Projects that would result in a net loss of vernal pool habitat.
- Projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species.

Since listed plants often have very specific habitat requirements and are typically found at sites that are often undisturbed and aquatic and wetland restoration projects generally occur in altered and disturbed areas, we anticipate few aquatic restoration projects will occur at sites that support covered non-vernal pool plant species, as such, we expect few individual non-vernal pool plant species to be adversely affected per project. However, some restoration activities, and resulting exposures, are likely to result in injury or mortality of individual plants. The eligibility requirements, prohibited actions, protection measures, combined, will minimize effects to

covered non-vernal pool plant species such that implementation of restoration actions are not expected to affect species abundance, productivity, distribution, or genetic diversity of any covered non-vernal pool plant species within the Action Area. We do not anticipate long-term negative effects to any listed plant populations from aquatic restoration projects, nor do we expect the number and productivity of any covered non-vernal pool plant species to be appreciably reduced or diminished across the ranges of each species. As the quality and quantity of habitat is improved, the long-term viability of local populations will likely be enhanced.

3.4.2.8.2. Herbicide Use

The use of herbicides poses a significant risks to covered plant species. Covered plant species may be exposed to herbicides during their application through direct spraying, indirect (drift) spraying, surface runoff, sub-surface leaching, wind erosion, and the use of contaminated irrigation water. These conditions could result in harm or death of listed plants. However, the following additional plant protection measures were developed to further reduce the risk to listed plant species:

- PLANT-2, Exclusion Buffer Establishment. A minimum 50-foot avoidance buffer around all Covered plants or their suitable habitat to be avoided will be clearly delineated with flagging or field markers. A larger exclusion buffer may be established if determined by the Qualified Biologist to be necessary for the protection of the Covered plants. No work activity will occur within the exclusion buffer, except as permitted under Measure PLANT-4, Work Restrictions in the Exclusion Buffer. Additionally, a buffer of at least 300 feet from any vernal pool, vernal pool grassland, or seasonal wetland, known Covered plants occurrence, or designated critical habitats will be established for the following:
    - staging areas of all equipment for storage, fueling, and maintenance, with hazardous-material-absorbent pads available in the event of a spill
    - mixing of pesticides, herbicides, or other potentially toxic chemicals
- PLANT-6, Herbicide Application, Clearing, and Ground Disturbance near Covered Plants. If mechanical removal is not effective, or could damage sensitive habitats, limited herbicide application may occur as noted below and in accordance with GPMs VHDR-6 through VHDR-8. See also VPBR-8, Herbicide Application, Clearing, and Ground Disturbance Near Vernal Pools, for measures to protect vernal pool plants.
    - Work Near Other Covered Plant Species (non-vernal pool species): To avoid impacts to other Covered Species (non-vernal pool species), the following protections will be applied:
        - Application of herbicide will occur during dry conditions, to the maximum extent practicable.
        - Backpack and hand-held herbicide application, if applied in dry conditions, is prohibited within 5 feet of any Covered plant. Protect Covered plants from herbicide drift (e.g., cover with plastic when spraying, or use a wick applicator).

- Broadcast and power spray herbicide application is prohibited

The general and specific protection measures described above will ensure herbicides are only used when and where necessary, minimize over exposure by ensuring herbicides are applied correctly and according to label, and reduce the risk of herbicide application on non-target species. Therefore, the potential for listed plant species to come in contact with herbicides should be greatly reduced during their applications. In addition, long-term benefits are expected with the appropriate use of herbicides because listed plants will have reduced competition with non-native plant species.

3.4.2.8.3. Non-vernal Pool Plant Species-Specific Analyses

3.4.2.8.3.1. Ben Lomond spineflower

Ben Lomond spineflower only occurs within the Zayante sandhills in Santa Cruz County, California. It is a short-lived annual species that undergoes large variations in abundance from year to year (see Appendix C). Ben Lomond spineflower are most likely to be affected by techniques used for floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat; establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands; and establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed sites. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for Ben Lomond spineflower recommends to the identify opportunities for restoration and enhancement of any sites considered important for recovery of the species (USFWS 1998b). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded habitat conditions are a common stressor to native plant species. Most of the restoration activities that would adversely affect covered plants would occur when covered plant species occur adjacent to aquatic habitats.

In addition to the General Protection Measures and General Plant Protection Measures designed to minimize the number of Ben Lomond spineflower adversely affected by the proposed action, the following additional restriction is provided in General Plant Protection Measure PLANT-3: Based on the results of the botanical surveys, complete avoidance of populations onsite during their respective blooming periods will be applied for the following four Covered plant species with limited populations: Ben Lomond spineflower, soft bird's-beak, Suisun thistle, and Howell's spineflower.

Given the Protection Measures, the eligibility criteria, the prohibited acts (including the requirement to be consistent with Recovery Plans), and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.8.3.2. California seablite

California seablite is known from three sites in the San Francisco Bay and scattered locations along the shoreline of Morro Bay, San Luis Obispo County, California. It occupies the upper edge of tidal marsh and prefers coarse marsh sediments or sheltered estuarine beaches (see Appendix C). California seablite are most likely to be affected by techniques used for establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The stated goal of the Recovery Plan which addresses California seablite is the comprehensive restoration and management of tidal marsh ecosystems of Northern and Central California (USFWS 2013). This objective aligns well with the restoration projects for which this PBO is addressing. Degraded tidal marsh ecosystems and associated estuarine wetland habitat conditions are a common stressor among tidal marsh animal and plant species. Most of the restoration activities that would adversely affect California seablite are those would occur in or adjacent to tidal marsh habitat.

Given the General Protection Measures and General Plant Protection Measures designed to minimize the number of California seablite adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the requirement to be consistent with Recovery Plans), and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.8.3.3. La Graciosa thistle and its critical habitat

La Graciosa thistle

La Graciosa thistle is currently restricted to back dune and coastal wetlands of southern San Luis Obispo County and northern Santa Barbara County, California. Most of the extant populations of La Graciosa thistle occur in wetlands associated with the Guadalupe dune complex; these include the freshwater wetlands of the Santa Maria River mouth and wetlands found in dune swales and dune lakes north of the river (see Appendix C). La Graciosa thistle are most likely to be affected by techniques used for floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat; establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands; and establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed site. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for La Graciosa thistle, near-term actions focus efforts at the remaining extant occurrences to prevent local extirpations by restoring habitat and minimizing the threats at each of these sites. This aligns well with the restoration projects for which this PBO is addressing. Degraded habitat conditions are a common stressor to native plant species. Most of

the restoration activities that would adversely affect covered plants would occur when covered plant species occur within or adjacent to aquatic habitats.

Given the General Protection Measures and General Plant Protection Measures designed to minimize the number of La Graciosa thistle adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, La Graciosa thistle critical habitat occurs in six units in San Luis Obispo and Santa Barbara County, California. Within these areas, the primary constituent elements for La Graciosa thistle consist of the following summarized four components: PCE-1) Mesic areas associated with margins of dune swales, dune lakes, marshes, and estuaries that are associated with dynamic (changing) dunes; PCE-2) Associated plant communities that includes Central dune scrub, coastal dune, coastal scrub, freshwater seep, coastal and valley freshwater marsh and fen, riparian scrub, oak woodland, intermittent streams, and other wetland communities; PCE-3) Soils with a sandy component including but not limited to dune sands; and PCE-4) Features that allow dispersal and connectivity between populations.

While the proposed action will have adverse effects to La Graciosa thistle critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following prohibited acts minimize impacts to La Graciosa thistle critical habitat function: 1) Projects that would result in a net loss of aquatic resource functions and/or services; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

3.4.2.8.3.4. Marsh sandwort

Marsh sandwort extends along the Pacific Coast from Washington state south throughout Southern California. It is known to occur in marshes, swamps and areas that are wet year-round (see Appendix C). Marsh sandwort are most likely to be affected by techniques used for floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

Degraded habitat conditions are a common stressor to native plant species. Most of the restoration activities that would adversely affect covered plants would occur when covered plant species occur within or adjacent to aquatic habitats.

Given the General Protection Measures and General Plant Protection Measures designed to minimize the number of marsh sandwort adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.8.3.5. Salt marsh bird's-beak

Salt marsh bird's-beak only occurs in coastal marsh complexes from Santa Barbara to San Diego County, California and south into northern Baja California, Mexico (see Appendix C). Salt marsh bird's-beak are most likely to be affected by techniques used for floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The Recovery Plan for Salt marsh bird's-beak recommends marsh restoration efforts to address invasive non-native plants. This objective aligns well with the restoration projects for which this PBO is addressing. Degraded habitat conditions are a common stressor to native plant species. Most of the restoration activities that would adversely affect covered plants would occur when covered plant species occur within or adjacent to aquatic habitats.

Given the General Protection Measures and General Plant Protection Measures designed to minimize the number of salt marsh bird's-beak adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

3.4.2.8.3.6. Ventura marsh milk-vetch and its critical habitat

Ventura marsh milk-vetch

Ventura marsh milk-vetch is currently restricted to Ventura County, California. There are few locations where this plant occurs within Ventura County. It occurs within coastal dune systems and transitional areas between wetlands and uplands adjacent to salt marshes and coastal lagoons (see Appendix C). Ventura marsh milk-vetch are most likely to be affected by techniques used for floodplain restoration to improve the diversity and complexity of aquatic, meadow, and riparian habitat; establishing, restoring, and enhancing tidal, subtidal, and freshwater wetlands; and establishment, restoration, and enhancement of stream and riparian habitat and upslope watershed site. Effects from these, and other, proposed activities are described in the General Effects section of this PBO (Section 3.4.1).

The 5-Year Review for Ventura marsh milk-vetch recommends habitat restoration around wetlands where this species occurs and where it may be transplanted (USFWS 2010b). This aligns well with the restoration projects for which this PBO is addressing. Degraded habitat conditions are a common stressor to native plant species. Most of the restoration activities that would adversely affect covered plants would occur when covered plant species occur adjacent to aquatic habitats.

Given the General Protection Measures and General Plant Protection Measures designed to minimize the number of Ventura marsh milk-vetch adversely affected by the proposed action, the eligibility criteria, the prohibited acts (including the requirement to be consistent with Recovery Plans) and the anticipated long-term benefits from each project to native habitats and listed species in the long-term, the proposed actions will not have any measurable effect on species-level abundance, productivity, or ability to recover.

Critical Habitat

As provided in Appendix C, Ventura marsh milk-vetch critical habitat occurs in Santa Barbara and Ventura County, California. Within these areas, the primary constituent elements for Ventura marsh milk-vetch consist of the following summarized five components: PCE-1) Vegetation cover of at least 50% but not exceeding 75%, consisting primarily of known associated native species; PCE-2) Low densities of nonnative annual plants and shrubs; PCE-3) The presence of a high water table; PCE-4) Soils that are fine-grained, composed primarily of sand with some clay and silt, yet are well-drained; and (5) Soils that do not exhibit a white crystalline crust that would indicate saline or alkaline conditions.

While the proposed action will have adverse effects to Ventura marsh milk-vetch critical habitat at the local, site-specific scale, these adverse effects will not be significant when evaluated at larger scales. They will also be minimized at the project level through the combination of the eligibility requirements, prohibited actions, and protection measures. Although restoration efforts to benefit Covered Species may directly adversely affect some habitat functions, the following prohibited acts minimize impacts to Ventura marsh milk-vetch critical habitat function: 1) Projects that would result in a net loss of aquatic resource functions and/or services; and 2) restoration projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species. The USFWS will provide technical assistance to the project proponent to ensure there is no net loss of critical habitat function.

4. CUMULATIVE EFFECTS

Cumulative effects are those effects of future State or private activities, not involving Federal Activities, that are reasonably certain to occur in the action area of the Federal action subject to consultation (50 CFR § 402.02). Future Federal actions are subject to the consultation requirements established in section 7 of the ESA and, therefore, are not considered in this PBO

as cumulative effects. In addition, actions not considered include those carried out by non-federal entities that have a federal nexus. Because projects on private or state lands often involve multiple parties and may include federal funds or permitting, it can be difficult to distinguish between projects with a federal nexus and those that can be properly described as having cumulative effects.

Please note, the contribution of non-federal activities to the current condition of federally-listed species and designated critical habitats within the program-level action area was described in the status of the species, critical habitat, and environmental baseline information provided earlier. Among those activities were agricultural activities; recreational activities; timber harvest; flood control facilities (e.g., levees); water delivery infrastructure, road construction and maintenance; gravel, rock, and metals mining; oil and gas drilling and extraction; wildfire risk reduction activities (e.g., fuel load reduction, vegetation management, fuel breaks, and control burning); and infrastructure development.

Based on the wide geographic scope and the duration of the Proposed Action, future state or private activities that could cumulatively affect the Covered Species would most likely occur in specific geographic areas as projects are implemented statewide, but they are not currently identifiable. Those future state or private activities would be identified for each Proposed Restoration Project during the Lead Action Agency's evaluation of that project and would be included in the ESA Section 7(a)(2) Review Form.

5. CONCLUSION

Under section 7(a)(2) of the ESA, federal agencies must ensure the activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Regulations implementing this section of the ESA define the phrase, "jeopardize the continued existence of" as "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). And "destruction or adverse modification" as "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).

Jeopardy

As described in the Analytical Framework for the Jeopardy Determination, the jeopardy analysis 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 evaluates the species' current range-wide condition relative to its reproduction, numbers, and distribution; the factors responsible for that

condition; its survival and recovery needs; and explains if the species' current range-wide population is likely to persist while retaining the potential for recovery or is not viable;

2. 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. This PBO also evaluates the current condition of the species in the action area relative to its reproduction, numbers, and distribution absent the consequences of the proposed action; 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, 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. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. 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 (see 50 CFR § 402.17). In this PBO we include an evaluation of all future consequences to the species that are reasonably certain to be caused by the proposed action, including the consequences of other activities that are caused by the proposed action, in the action area; and how those impacts are likely to influence the survival and recovery of the species; and

4. The Cumulative Effects, which evaluates the consequences of future, non-Federal activities reasonably certain to occur in the action area on the species, and how those impacts are likely to influence the survival and recovery role of the species.

Adverse Modification

In accordance with policy and regulation, the adverse modification analysis in this PBO relies on four components:

1. the *Status of Critical Habitat*, which evaluates the range-wide condition of designated critical habitat for listed species in terms of PCEs, the factors responsible for that condition, and the intended recovery function of the critical habitat overall;
2. the *Environmental Baseline*, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area;
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 PCEs and how that will influence the recovery role of affected critical habitat units; and
4. *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the recovery role of affected critical habitat units.

For purposes of the adverse modification determination, the effects of the proposed Federal action on critical habitat are evaluated in the context of the range-wide condition of the critical habitat, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the listed species.

The analysis in this PBO places an emphasis on using the intended range-wide recovery function of critical habitat and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

5.4. Species Conclusion

After reviewing the current status and baseline of the species in Table 1, the effects of the proposed action, and the cumulative effects, it is our biological and conference opinion that the proposed action is not likely to jeopardize the continued existence of these 61 species. We reached this conclusion based on the information and analysis in sections 3.3, 3.4, and 4.0 of this PBO.

5.5. Critical Habitat Conclusion

After reviewing the current status and baseline of the critical habitat for the 36 species with critical habitat designated in Table 1, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to result in the destruction or adverse modification of critical habitat for these 36 species. We reached this conclusion based on the information and analysis in sections 3.3, 3.4, and 4.0 of this PBO.

5.6. Summary

Previous chapters and appendices of this PBO presented the current status of all the Covered Species and any designated critical habitat likely to be adversely affected by this proposed action, the environmental baseline within the action area for each of these species, the effects of the proposed action on each of these species and any associated critical habitat, and cumulative effects. As provided in the earlier chapters, it is USFWS's biological and conference opinion that the proposed action is not likely to jeopardize the continued existence of the 61Covered Species identified in Table 1 or result in the destruction or adverse modification of critical habitat that has been designated for 36 of those species. Our conclusions are based on information provided in the sections above, the appendices, and the body of literature and information referenced in this document.

6. INCIDENTAL TAKE STATEMENT

6.1. Introduction

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened animal species, respectively, without special exemption. Take is defined by the ESA as actions that harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct (ESA section 3(18)). Harm is further defined as an act that actually kills or injures fish or wildlife (50 CFR § 17.3). Such an act may include significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering (50 CFR §17.3). Incidental take is defined as takings that result from, but are not the purpose of, carrying out of an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR § 402.02). 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 an incidental take statement and occurs as a result of the action as proposed.

The USFWS's regulatory definition of harass is constrained to "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" and therefore is not considered incidental take (50 CFR § 17.3). If intentional acts are determined to be a form of take (trap, capture, harass, etc.), when the USFWS analyzes those activities as part of the proposed action and includes them in an Incidental Take Statement, that is considered adequate to serve as the exemption for that take. Under the terms of sections 7(b)(4) and 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking, provided that such taking is compliant with the terms and conditions of this Incidental Take Statement.

This incidental take statement is based upon the proposed action occurring as described in the accompanying Biological and Conference Opinion. Take of listed species in accordance with this incidental take statement is exempted under section 7(o)(2) of the ESA. The Action Agency must implement the proposed action as described in this biological and conference opinion and undertake the non-discretionary measures described below; otherwise, the exemption provided under section 7(o)(2) of the Act may lapse. To monitor the impact of incidental take, the Action Agency must report the progress of its action and the impact on the species to the USFWS as specified in this incidental take statement (50 CFR 402.14(i)(3)). For those actions for which the Action Agency is not undertaking, but is authorizing or funding, the Action Agency must ensure that the applicant implements the proposed action as described in this biological and conference opinion otherwise, the exemption provided under section 7(o)(2) of the ESA may lapse. The Action Agency has a continuing duty to regulate the activity covered by this incidental take statement.

The reasonable and prudent measures, and terms and conditions, described below are non-discretionary, and must be undertaken by the action agency so that they become binding conditions of any grant or permit issued or authorization provided by the federal action agency to

the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The action agency has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the action agency (1) fails to include the terms and conditions in its authorizing decision or (2) fails to exercise oversight to ensure compliance that any applicant adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant or authorizing document, or (3) fails to retain discretion to ensure compliance with the terms and conditions through the extent of the project, the Protection coverage and exemption provided in section 7(o)(2) may not apply. In order to monitor the effect of incidental take, the action agency must ensure that its grant, permit, or authorization includes all reporting requirements, including reporting the progress of the proposed action and its impact on the species to the USFWS as specified in the Incidental Take Statement [50 CFR § 402.14(i)(3)].

Regulations allow for Incidental Take Statements to rely on the use of "surrogates" for estimating the amount of take that is reasonably certain to occur as a result of the proposed action in certain circumstances. To use a surrogate to estimate take, the following criteria must be met: (1) the Incidental Take Statement must describe the causal link between the surrogate and the take of the listed species; (2) the Incidental Take Statement must explain why it is not practical to express the amount or extent of anticipated take or to monitor take-related impacts in terms of individuals of the listed species; and (3) the Incidental Take Statement must set a clear standard for determining when the level of anticipated take of the listed species has been exceeded.

6.2. Amount of Extent of Take Anticipated

Incidental take for each restoration project will be estimated in the ESA Section 7(a)(2) Review Form, minimized in coordination with the respective Field Office, accounted for by USFWS using an internal tracking mechanism, and confirmed via the Post-Construction Report Form.

As stated earlier in this PBO, the Action Agencies created self-imposed annual take limits for each of the covered animal species (see Table 4). These take limits were developed collaboratively among the Action Agencies to be sufficient to ensure needed restoration actions can be fully implemented. They were established using information from previous restoration project biological opinions and consideration of USFWS species expert opinion. As such, the Action Agencies agreed that projects that may cause the self-imposed annual take limit to be exceeded, will need to wait until the following year. If any self-imposed take limits are exceeded, the Action Agencies will not authorize new projects that have the potential to result in take of those species and will meet with the USFWS to discuss the potential need for re-initiation. Re-initiation of formal consultation would also require re-evaluation of the effects of the action on the respective species.

As a result of the creation of the self-imposed take limits and since this PBO concluded the self-imposed take limits, in combination with the other protection measures, is not likely to jeopardize the continued existence of the Covered Species, the estimated amount of take that is reasonably certain to occur as a result of the proposed action, as described in this PBO (and the PBA), is identical to the self-imposed take limits established in the project description. However,

the information provided below in Table 14 is organized differently than in Table 4 to provide distinction among standard numerical take limits, take defined by a surrogate, and harm that may result from habitat modifications or noise.

Table 14: Estimated Incidental Take for Covered Animal Species

Class	Species	Injury and Mortality Estimate	Estimate using a Surrogate
Amphibians			
	arroyo (arroyo southwestern) toad	No more than 10 adults or juveniles injured or killed; 5% of larval captures killed or injured; 2 egg strands damaged or destroyed annually.	
	California red-legged frog	No more than 60 terrestrial adults or juveniles injured or killed outside of the Sierra Nevada (shared between Field Offices), 5 terrestrial adults or juveniles injured or killed for locations within the Sierra Nevada; and 5% of captures injured or killed annually.	
	California tiger salamander – Central California DPS	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office; No more than 5% of larval captures injured or killed annually.	
	California tiger salamander – Santa Barbara County DPS	No more than 5 adults or juveniles injured or killed annually and no more than 5% of larval captures killed or injured per pond annually.	
	Foothill yellow-legged frog	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office. No more than 5% of larval captures injured or killed annually.	

	mountain yellow-legged frog – northern California DPS	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office. No more than 5% of larval captures injured or killed annually.	
	Santa Cruz long-toed salamander	No more than 5 adults or juveniles injured or killed annually. No more than 5% of larval captures killed or injured per pond annually.	
	Sierra Nevada yellow-legged frog	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office annually. No more than 5% of larval captures injured or killed annually.	
	Yosemite toad	No more than 20 adults or juveniles injured or killed annually and no more than 10 per Field Office annually. No more than 5% of larval captures injured or killed annually.	
Birds			
	California least tern	No lethal take allowed.	
	California clapper rail	Injury or mortality of no more than 1 individual annually.	
	coastal California gnatcatcher	Injury or mortality of no more than 1 nest annually. Mortality to a nest would include disturbance to an active nest with egg(s) or chick(s) in the nest or if fledglings are still dependent on the nest for survival.	

	least Bell's vireo	Injury or mortality of no more than 8 individuals and 4 nests annually. Mortality to a nest would include disturbance to an active nest with egg(s) or chick(s) in the nest or if fledglings are still dependent on the nest for survival.	
	light-footed Ridgway's rail	No direct Injury or Mortality (See Table 15)	
	marbled murrelet	Injury or mortality to no more than 1 nesting murrelet pair and their dependent young (1 egg/chick per annual clutch) per recovery unit annually.	
	northern spotted owl	No direct Injury or Mortality (See Table 15)	
	western snowy plover – Pacific Coast population DPS	Death or injury of no more than 2 individuals annually per recovery unit.	
Fish			
	Delta smelt	No more than 1 individual injured or killed annually.	
	Lahontan cutthroat trout	No more than 3% of capture and relocations injured or killed.	No more than 20 NTUs 500 feet downstream of the project site or no more than 20% above background conditions, whichever is greater.
	tidewater goby	No more than 10% of all individuals captured and relocated may be injured or killed per project.	
	unarmored threespine stickleback	No more than 2 individuals injured or killed per local population annually.	
Invertebrate			
	California freshwater shrimp	No more than 3% of captured and relocated individuals injured or killed per project.	

	Conservancy fairy shrimp		No more than 10% temporary habitat loss per occupied pool. No limit for projects where the sole purpose of the impact is to restore ecological function to the vernal pool.
	longhorn fairy shrimp		No more than 10% temporary habitat loss per occupied pool. No limit for projects where the sole purpose of the impact is to restore ecological function to the vernal pool.
	Mount Hermon June beetle	No more than 20 individuals injured or killed annually.	
	Riverside fairy shrimp		No more than 10% temporary habitat loss per occupied pool. No limit for projects where the sole purpose of the impact is to restore ecological function to the vernal pool.
	San Diego fairy shrimp		No more than 10% temporary habitat loss per occupied pool. No limit for projects where the sole purpose of the impact is to restore ecological function to the vernal pool.
	Smith's blue butterfly		No more than 25 host plants lost annually.
	valley elderberry longhorn beetle		No more than 50 elderberry shrubs lost annually.
	vernal pool fairy shrimp		No more than 10% temporary habitat loss per occupied pool. No limit for projects where the sole purpose of the impact is to restore ecological function to the vernal pool.
	vernal pool tadpole shrimp		No more than 10% temporary habitat loss per occupied pool. No limit for projects where the sole purpose of the impact is to restore ecological function to the vernal pool.
Mammals			

	riparian (San Joaquin Valley) woodrat	Injury or mortality of no more than 2 individuals annually.	
	riparian brush rabbit	Injury or mortality of no more than 2 individuals annually.	
	salt marsh harvest mouse	Injury or mortality of no more than 2 individuals and 1 nest equivalent annually. 1 nest equivalent is equal to all young within the nest or 4 total juveniles if a nest is not found.	
Reptiles			
	Alameda whipsnake (striped racer)	Injury or mortality to no more than 4 adults or juveniles/hatchlings annually.	
	giant garter snake	Injury or mortality to no more than 4 adults or juveniles/hatchlings annually.	
	San Francisco garter snake	Injury or mortality to no more than 4 adults or juveniles/hatchlings annually.	

Surrogates

For Lahontan cutthroat trout, Smith's blue butterfly, valley elderberry longhorn beetle and all vernal pool Branchiopoda, we used a surrogate to estimate the amount of take that is reasonably certain to occur as a result of the proposed action. For Lahontan cutthroat trout (LCT), we include a numerical estimate for those that may be injured or killed due to relocation actions. We also included a surrogate to address take associated with in-water work because LCT move over time, are difficult to survey while spawning or migrating, have highly fluctuating population numbers over time, precise data over time is lacking, and predicting river conditions (i.e., temperature, flow) at the time of the proposed action is problematic. Also, finding a dead or wounded LCT as a result of most of the proposed project activities would not only be difficult (e.g., fish may be crushed and killed, and then swept downriver), but also unlikely. Therefore, the USFWS used the concentration of the turbidity plume and the downstream length of area anticipated to be impacted by the proposed action as surrogates for take; not to exceed 20 NTUs 500 feet downstream of the project site or no more than 20% above background conditions, whichever is greater.

For Smith's blue butterfly, we only included a surrogate to address take because we cannot quantify the precise numbers of Smith's blue butterflies that would be killed or injured because of their small size and finding dead or wounded Smith's blue butterfly eggs, larvae, pupae, or adults is unlikely. Since all life stages of Smith's blue butterfly are inextricably tied to their host plant, any injury or mortality to its host plant (specific buckwheat species) could result in take of all life stages of Smith's blue butterfly in the form of harm, capture, injury, and mortality as a result of implementing restoration projects. Therefore, the number of host plants is used as the surrogate; not to exceed 25 host plants lost annually range-wide. As a result, we estimate that all Smith's blue butterflies and their eggs, larvae, and pupae within 25 host plants will be subject to incidental take in the form of injury or mortality annually.

For valley elderberry longhorn beetle, we only included a surrogate to address take because direct injury or mortality of valley elderberry longhorn beetles can be difficult to locate due to their cryptic appearance and their habitation of the inner cambium of elderberry shrubs during most of their life cycle. Also, finding a dead or injured individual is unlikely due to their small size. Losses of individual beetles may also be difficult to quantify due to seasonal fluctuations in their numbers. Therefore, the number of host plants is used as the surrogate; not to exceed 50 elderberry shrubs lost annually range-wide. As a result, we estimate that all valley elderberry longhorn beetles and their eggs within 50 elderberry shrubs will be subject to incidental take in the form of injury or mortality annually.

For all vernal pool Branchiopoda, we only included a surrogate for take because vernal pool Branchiopoda are difficult to detect due to the fact that it is not possible to know how many individuals occupy any wetland feature, how many eggs are in the soil of any wetland feature, or how many individuals or eggs or will occupy any feature later in time. In such circumstances, we use the amount of habitat impacted as a surrogate for estimating take. The acreage of suitable habitat is used as the surrogate: not to exceed 10% temporary habitat loss per occupied pool. However, there is no limit for projects where the sole purpose of the impact is to restore ecological function to the vernal pool. Therefore, we estimate that for most projects all Branchiopoda and their eggs within 10% of an occupied pool will be subject to incidental take in the form of capture, injury, or mortality annually. For those projects with the sole purpose of restoring vernal pool ecological function, all Branchiopoda and their eggs within the pool will be subject to incidental take in the form of capture, injury, or mortality.

Harm

In addition to the take estimates provided for direct injury and mortality, including those using a surrogate, Covered Species may be harmed by implementation of the proposed action, as described in the effects analysis. As described in more detail below, we are two species with specific self-imposed take limits in the form of harm: coastal California gnatcatcher and northern spotted owl (see Table 15 below). Such harm could be in the form of habitat modification, noise or lighting. Additional clarity regarding harm via habitat modification, noise, and species handling, capture and relocation is provided below.

Table 15: Estimated Incidental Take in the form of Harm for Covered Animal Species

Class	Species	Take in the Form of Harm
Birds		
	coastal California gnatcatcher	No more than 2 individuals annually.
	light-footed Ridgway's rail	No more than 5% of a given population annually.
	northern spotted owl	No more than 18 nesting individuals harmed from disturbance annually.

(a) Habitat modifications

The modification of habitat will likely result in harm to Covered Species by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering. However, habitat modifications are limited in the project description by the following:

1. The goal with each restoration project is no net loss of waters of the United States and only discountable adverse effects to federally-listed species and their critical habitat through implementation of relevant protection measures and/or offsetting habitat restoration or enhancement as part of the project design and within the project footprint, when feasible;
2. All projects must meet the definition of a restoration project and be consistent with USFWS recovery plans or recovery-related documentation for Covered Species. A restoration project is defined as an eligible project type and relevant protection measures that will result in a net increase in aquatic, riparian, floodplain, wetland, or coastal dune resource functions and/or services through implementation of the eligible project types, relevant protection measures, and design guidelines;
3. To avoid and minimize habitat disturbance or loss of Covered Species habitat, projects will consider, as part of the project design, the goals of Recovery Plans for site-appropriate Covered Species. Adverse effects to habitat will be further avoided and minimized by considering applicable project design guidelines; and
4. Prohibited activities
    a. Projects that would result in a net loss of aquatic resource functions and/or services.
    b. Projects that would result in a net loss of vernal pool habitat.
    c. Projects that would result in a net loss of designated critical habitat function for any federally-listed species. Loss of function is considered in the context of the physical and biological features as described in the respective critical habitat designation and includes abiotic and biotic resources and conditions necessary to support one or more life processes of the species.

Table 16: Habitat Modification Limits

Class	Species	Habitat Modification Limit
Amphibians		
	arroyo (arroyo southwestern) toad	Net loss of aquatic resource functions and/or services is prohibited.
	California red-legged frog	Net loss of aquatic resource functions and/or services is prohibited.
	California tiger salamander – Central California DPS	Net loss of aquatic resource functions and/or services is prohibited.
	California tiger salamander – Santa Barbara County DPS	Net loss of aquatic resource functions and/or services is prohibited.
	Foothill yellow-legged frog	Net loss of aquatic resource functions and/or services is prohibited. Individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area.
	mountain yellow-legged frog – northern California DPS	Net loss of aquatic resource functions and/or services is prohibited. Individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area.
	Santa Cruz long-toed salamander	Net loss of aquatic resource functions and/or services is prohibited.
	Sierra Nevada yellow-legged frog	Net loss of aquatic resource functions and/or services is prohibited. Individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area.
	Yosemite toad	Net loss of aquatic resource functions and/or services is prohibited. Individual projects will be designed/implemented to not adversely affect a significant portion of the population in the project area.
Birds		
	California least tern	Habitat occupied by California least tern will be avoided to the maximum extent possible. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area. No

		net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
	California clapper rail	The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
	coastal California gnatcatcher	No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
	least Bell's vireo	The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area, except for restoration projects where the purpose is to remove non-native vegetation to improve least Bell's vireo habitat. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
	light-footed Ridgway's rail	The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
	marbled murrelet	No potential marbled murrelet nest trees will be removed during any time of year.
	northern spotted owl	In all suitable NRF habitat removal or damage of trees will be limited. Project activities will not result in a net loss of habitat or downgrade or remove the function of suitable nesting, foraging and roosting habitat to the degree the habitat does not function in the capacity that existed prior to treatment. In suitable foraging habitat in northern spotted owl core areas and in northern spotted owl home ranges downgrading or removal of suitable foraging habitat function will be avoided.

	western snowy plover – Pacific Coast population DPS	Habitat occupied by western snowy plover will be avoided to the maximum extent possible. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of occupied plover habitat.
Fish		
	Delta smelt	Net loss of aquatic resource functions and/or services is prohibited. The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of the population in the project area. No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
	Lahontan cutthroat trout	Net loss of aquatic resource functions and/or services is prohibited. Disturbance to aquatic habitat for covered fish species will be avoided and/or minimized to the maximum extent practicable, unless the purpose of the project is to provide overall benefits to the species and the benefits are greater that any temporary impacts to habitat.
	tidewater goby	Net loss of aquatic resource functions and/or services is prohibited. Disturbance to aquatic habitat for covered fish species will be avoided and/or minimized to the maximum extent practicable, unless the purpose of the project is to provide overall benefits to the species and the benefits are greater that any temporary impacts to habitat.
	unarmored threespine stickleback	Net loss of aquatic resource functions and/or services is prohibited. Disturbance to aquatic habitat for covered fish species will be avoided and/or minimized to the maximum extent practicable, unless the purpose of the project is to provide overall benefits to the species and the benefits are greater that any temporary impacts to habitat.
Invertebrate		
	California freshwater shrimp	Net loss of aquatic resource functions and/or services is prohibited.

	Conservancy fairy shrimp	Net loss of vernal pool habitat is prohibited. No more than 10% temporary habitat loss per occupied pool. No limit for projects where the sole purpose of the impact is to restore ecological function to the vernal pool.
	longhorn fairy shrimp	Net loss of vernal pool habitat is prohibited. No more than 10% temporary habitat loss per occupied pool. No limit for projects where the sole purpose of the impact is to restore ecological function to the vernal pool.
	Mount Hermon June beetle	To avoid and minimize habitat disturbance or loss of Covered Species habitat, projects will consider, as part of the project design, the goals of Recovery Plans.
	Riverside fairy shrimp	Net loss of vernal pool habitat is prohibited. No more than 10% temporary habitat loss per occupied pool. No limit for projects where the sole purpose of the impact is to restore ecological function to the vernal pool.
	San Diego fairy shrimp	Net loss of vernal pool habitat is prohibited. No more than 10% temporary habitat loss per occupied pool. No limit for projects where the sole purpose of the impact is to restore ecological function to the vernal pool.
	Smith's blue butterfly	Surrogate take limits host plant impacts to 25 plants annually.
	valley elderberry longhorn beetle	Surrogate take limits host plant impacts to 50 plants annually.
	vernal pool fairy shrimp	Net loss of vernal pool habitat is prohibited. No more than 10% temporary habitat loss per occupied pool. No limit for projects where the sole purpose of the impact is to restore ecological function to the vernal pool.
	vernal pool tadpole shrimp	Net loss of vernal pool habitat is prohibited. No more than 10% temporary habitat loss per occupied pool. No limit for projects where the sole purpose of the impact is to restore ecological function to the vernal pool.
Mammals		
	riparian (San Joaquin Valley) woodrat	The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a population in the project area.

	riparian brush rabbit	The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a population in the project area.
	salt marsh harvest mouse	The local USFWS Field Office and Project Proponent will work together during the ESA Section 7(a)(2) Review Form process to ensure an individual project does not adversely affect a significant portion of a population in the project area. No net loss of habitat through implementation of protection measures and/or offsetting impacts with habitat restoration or enhancement.
Reptiles		
	Alameda whipsnake (striped racer)	No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
	giant garter snake	No net loss of habitat through the protection measures and/or offsetting impacts with habitat restoration or enhancement.
	San Francisco garter snake	No permanent loss of hibernacula.

We refrain from establishing an independent estimate of take/re-initiation criteria for habitat modification beyond those identified for injury and mortality for the species. This is because the four habitat modification limits provided in the project description above and the species-specific habitat modification limits provided in Table 16 are expected to minimize such impacts to avoid harm of individuals from habitat modification from implementing the project, as described in this PBO.

(b) Noise

The effect of sound disturbances to the individual covered animal species is not well studied and among the studies that do exist, results can be conflicting. Such conflicting results are likely due to the challenge of quantifying and categorizing the disturbance (i.e., type, frequency, proximity) with response variables (i.e., behavior, reproductive success, survival). Other factors that influence the observed consequences of noise impacts include timing, health of an individual, ambient or background sound levels, as well as how sound is influenced by topography, vegetation, and humidity. We recognize that noise and vibrations from the restoration activities could disturb Covered Species in the action area, however, protection measures, including pre-construction surveys, seasonal avoidance, and biological monitoring will minimize these adverse effects. We are not establishing an independent estimate of take/re-initiation criterion for the

number of animals that may be harmed or harassed due to noise. We refrain from establishing an independent estimate of take/re-initiation criteria specifically for noise impacts, beyond those identified for injury and mortality generally, because it is unlikely we can differentiate impacts due solely to noise, versus other stressors, and the protection measures are expected to minimize such impacts to avoid injury and mortality of individuals.

(c) Species Handling, Capture and Relocation

We are not establishing an independent estimate of take/re-initiation criterion for the number of Covered Species that would be handled, captured and/or relocated due to restoration activities considered in this PBO. We refrain from establishing an independent estimate of take/re-initiation criteria for the number of animals that may be harmed or harassed due to handling, capture and relocation beyond those identified for injury and mortality generally, because individual Covered Species can be difficult to find, their numbers change over time, the protection measures are expected to minimize such impacts to avoid injury and mortality of individuals, and we encourage proponents to diligently pursue detection of individual Covered Species without fear of project delays.

In summary, other than the three species with a specific estimate of take from harm provided in Table 15, all take from harm that will result from implementation of the proposed restoration projects, as described in this PBO, is exempt under section 7(o)(2). For coastal California gnatcatcher, light-footed Ridgway's rail, and northern spotted owl, take from harm is exempt under section 7(o)(2) up to the limits provided in Table 15.

6.3. Summary

As provided in the earlier sections of this PBO, the USFWS determined that the level of anticipated take is not likely to result in jeopardy to any of the 61 Covered Species identified in Table 1.

6.4. Reasonable and Prudent Measures

Pursuant to 50 CFR § 402.14(i)(1)(ii) and (iv), the incidental take statement specifies those reasonable and prudent measures (RPMs) that are considered necessary or appropriate to minimize the impact to such incidental taking on the species, and terms and conditions (including reporting requirements) that must be complied with by the action agency or applicant to implement the RPMs. These must be carried out for the exemption in section 7(o)(2) to apply.

As part of the overall project design, the Action Agencies have taken steps to avoid and minimize impacts to listed species through the administrative process, eligible project types, construction measures and protection measures. The USFWS's evaluation of jeopardy and incidental take is premised upon implementation of the protection measures. Any subsequent changes to the protection measures described in this PBO may constitute a modification of the

proposed action and may warrant reinitiating formal consultation, as specified at 50 CFR § 402.16 and in the Reinitiation - Closing Statement below.

The USFWS did not identify any RPMs and Terms and Conditions necessary and appropriate to further minimize the impacts of incidental take of Covered Species from the proposed action.

6.5. Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the action agency must fully comply with any Terms and Conditions that implement the reasonable and prudent measures. Such terms and conditions are nondiscretionary with respect to species listed under the ESA. However, since no RPMs were identified there are no corresponding Terms and Conditions.

6.6. Monitoring and Reporting Requirements

When incidental take is anticipated, provisions for monitoring to report the progress of the proposed action and its impact on the listed species as specified in the Incidental Take Statement (50 CFR §402.14(i)(3)), must be identified.

Monitoring the amount or extent of take is often difficult. Thus, the project description included monitoring and reporting requirements in the PBA and described in Section 2.1.2.6 of this PBO. A summary is provided below:

- Roles and responsibilities: Project Proponents are responsible for conducting all applicable project monitoring and reporting requirements prior to, during, and after project construction (e.g., revegetation monitoring, species rescue, and relocation reporting).

- Tracking incidental take:
    - Project Proponents will use the ESA Section 7(a)(2) Review Form to document metrics needed to calculate estimated incidental take.
    - The USFWS Field Office will identify the incidental take expected from the project and enter that estimate into a USFWS maintained internal tracking tool. The USFWS ES Pacific Southwest Regional Office will maintain the tracking tool for use by the USFWS Field Offices.
    - The Project Proponent will report all injury or mortality of listed species to the USFWS Field Office within 48 hours.
    - The Post-Construction Report Form will be used to document actual incidental take from the project.

- Post Construction Reporting:
    - Project Proponents will provide a completed Post-Construction Report Form (Appendix B) to the respective USFWS Field Office (and copy the Action Agency) by December 1.

- If there are ongoing revegetation or species monitoring beyond the report due date, a report will be provided annually on December 1 until success criteria have been met or monitoring has ceased.

- Annual Meeting: All Action Agencies (including other USFWS program areas) and USFWS Field Offices using the PBO will meet annually in January to discuss implementation, cumulative impacts, and identify any need for changes to the program and process. USFWS Pacific Southwest Regional Office ES Program will be responsible for scheduling and hosting the meeting.

7. DISPOSITION OF SICK, INJURED, OR DEAD SPECIMENS

Upon locating a dead, injured, or sick endangered or threatened species specimen, this must be reported to the USFWS Resident Agent in Charge (Sacramento 916-569-8444 or Los Angeles 310-328-1516), and prompt notification must be made to the nearest USFWS Field Office.

Care should be taken in handling sick or injured specimens to ensure effective treatment and care or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered species or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

The USFWS is to be notified in writing within 48 hours of the accidental death of, or injury to, a threatened or endangered species, or of the finding of any dead or injured specimen during implementation of the proposed action. Notification must include the date, time, and location (including GPS location information in UTM, NAD 83) of the incident or discovery, as well as any pertinent information on circumstances surrounding the incident or discovery. Care should be taken in handling sick or injured specimens to ensure effective treatment and care, or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered or threatened species or preservation of biological materials, the finder has the responsibility to carry out instructions provided by USFWS Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

8. CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the ESA direct Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species and the ecosystems upon which they depend. Regulations in 50 CFR § 402.02 define conservation recommendations as discretionary measures suggested by the USFWS to minimize or avoid adverse effects of a proposed action on a listed species or critical habitat, to help implement recovery plans, or to develop information.

We propose the following conservation recommendations:

1. We recommend that the biologist(s) relocate other native reptiles and amphibians found within work areas to suitable habitat outside of project areas if such actions are in compliance with State laws.

2. We recommend that dead federally-listed amphibians found within work areas be tested for amphibian disease.

3. We recommend the Action Agency engage the USFWS to discuss the need to re-initiate consultation if the rate that incidental take is occurring in any given year indicates that it may exceed the re-initiation triggers.

4. We recommend the following conservation recommendations for northern spotted owl:

    a. Biologists or other biological monitors are encouraged to be on site during aquatic or upland treatments in northern spotted owl nesting, roosting, or foraging (NRF) habitat, or to regularly follow up on treatments in these habitats. This will provide an opportunity to ensure the project design features and expected results are being achieved in NRF habitat.

    b. If large size class conifer trees (20" diameter at breast height or larger) need to be felled as part of aquatic or upland restoration actions in northern spotted owl NRF habitat, leave them in place as large downed wood, as safely feasible (e.g., fell so as not to block any drainage structures or ditches, culverts, or bridges).

    c. Submit any survey data identifying occurrences of northern spotted owls and barred owls to the California Department of Fish and Wildlife's BIOS database.

In order for the USFWS to be informed of actions minimizing or avoiding adverse effects or that benefit listed species or their habitats, the USFWS requests notification of the implementation of any conservation recommendations.

9. REINITIATION – CLOSING STATEMENT

This concludes the conference and formal consultation on the Programmatic Restoration Effort.

You may ask the Service to confirm the conference opinion as a biological opinion issued through formal consultation if any of the four foothill yellow-legged frog DPS are designated. The request must be in writing. If the Service reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the conference, the Service will adopt the conference opinion as the biological opinion on the project and no further section 7 consultation will be necessary. Please note that the incidental take statement provided in this conference opinion does not become effective until the species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the

foothill yellow-legged frog DPS(s) has occurred. Modifications of the opinion and incidental take statement may be appropriate to reflect that take. No take of the species/DPS may occur between the listing of the species/DPS and the adoption of the conference opinion through formal consultation, or the completion of a subsequent formal consultation.

As provided in 50 CFR § 402.16, reinitiation of consultation is required and shall be requested by the Federal Agency, or by the USFWS, where discretionary Federal involvement or control over the action has been retained or is authorized by law and:

1. If the amount or extent of taking specified in the incidental statement is exceeded.
2. 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;
3. 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 this PBO or written concurrence; or
4. If a new species is listed or critical habitat is designated that may be affected by the identified action.

To reinitiate consultation, contact the USFWS Pacific Southwest Regional Office in Sacramento, California and refer to the Reference Number 2022-0005149-S7.

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