Figure 1. California U.S. Army Corps of Engineers District Regulatory Boundaries. Specifically depicting the San Francisco District as it pertains to coverage of RGP-12.

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In Reply Refer to:
2022-0035277-S7

April 26, 2022

Senior Regulatory Project Manager
San Francisco District
U.S. Army Corps of Engineers
450 Golden Gate Avenue, 4th Floor, Suite 0134
San Francisco, California 94102
Gregory.G.Brown@usace.army.mil

Subject: Formal Consultation on the revision and reissuance of Regional General Permit 12 (RGP 12) for the California Department of Fish and Wildlife's Fisheries Restoration Grant Program

Dear Senior Regulatory Project Manager:

This letter is in response to the U.S. Army Corps of Engineer's (Corps) December 13, 2021, request for initiation of formal consultation with the U.S. Fish and Wildlife Service (Service) on the proposed revision and reissuance of the Corps' existing Regional General Permit 12 (RGP 12) for the California Department of Fish and Wildlife's (CDFW) Fisheries Restoration Grant Program (proposed project) in the Counties of Del Norte, Siskiyou, Humboldt, Trinity, Mendocino, Sonoma, Napa, Marin, San Francisco, San Mateo, Santa Cruz, Santa Clara, Monterey, and San Benito; the western portions of Solano, Contra Costa, and Alameda Counties; and the inland (Salinas River watershed) portion of San Luis Obispo County, California. Your request was received by the Service on December 13, 2021, via electronic mail. At issue are the proposed project's effects on the federally endangered California freshwater shrimp (*Syncaris pacifica*), the endangered tidewater goby (*Eucyclogobius newberryi*) and its critical habitat, the threatened California red-legged frog (*Rana draytonii*) and its critical habitat, the threatened Central California Distinct Population Segment (DPS) of the California tiger salamander (*Ambystoma californiense*) (Central California tiger salamander) and its critical habitat, the endangered Sonoma County DPS of the California tiger salamander (*Ambystoma californiense*) (Sonoma California tiger salamander) and its critical habitat, the endangered San Francisco garter snake (*Thamnophis sirtalis tetrataenia*), the endangered least Bell's vireo (*Vireo bellii pusillus*), the endangered southwestern willow flycatcher (*Empidonax traillii extimus*), the threatened marbled murrelet (*Brachyrampus marmoratus*) and its critical habitat, the threatened northern spotted owl (*Strix occidentalis caurina*) and its critical habitat, the threatened western snowy plover (*Charadrius nivosus nivosus*) and its critical habitat, the threatened western DPS of the yellow-billed cuckoo (*Coccyzus americanus*), the threatened Point Arena mountain beaver (*Aplodontia rufa nigra*), and listed plant species. This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.) (Act), and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR 402).

The federal action on which we are consulting is the revision and reissuance of the Corps' existing RGP 12 for CDFW's Fisheries Restoration Grant Program (FRGP). Pursuant to 50 CFR 402.12(j), you submitted a biological assessment (BA) for our review and requested concurrence with the findings presented therein. These findings conclude that the proposed project may affect, and is not likely to adversely affect the Central California tiger salamander and its critical habitat, the Sonoma California tiger salamander and its critical habitat, the least Bell's vireo, the southwestern willow flycatcher, the marbled murrelet and its critical habitat, the threatened northern spotted owl and its critical habitat, the western snowy plover and its critical habitat, the western DPS of the yellow-billed cuckoo, the Point Arena mountain beaver, and listed plant species.

The findings also conclude that the proposed project may affect and is likely to adversely affect the California red-legged frog and its critical habitat, the San Francisco garter snake, the California freshwater shrimp, and the tidewater goby and its critical habitat. Critical habitat has not been designated for the California freshwater shrimp, the San Francisco garter snake, or the Point Arena mountain beaver. Critical habitat has been designated for the least Bell's vireo, the southwestern willow flycatcher, and the yellow-billed cuckoo, but none occurs in the project area.

In considering your request, we based our evaluation on the following:

1) The Corps' December 13, 2021 letter requesting consultation;

2) CDFW's December 2021 Biological Assessment entitled *The California Department of Fish and Wildlife's Fisheries Restoration Grant Program's Renewal Biological Assessment for Regional General Permit 12*;

3) Other information available to the Service.

CONCURRENCE

The Service concurs that the proposed project is not likely to adversely affect the Central California tiger salamander and its critical habitat, the Sonoma California tiger salamander and its critical habitat, the least Bell's vireo, the southwestern willow flycatcher, the marbled murrelet and its critical habitat, the threatened northern spotted owl and its critical habitat, the western snowy plover and its critical habitat, the western DPS of the yellow-billed cuckoo, and the Point Arena mountain beaver.

Central California and Sonoma County Tiger Salamander and their Critical Habitat

We concur with your determination that the proposed authorization may affect, but is not likely to adversely affect the Central or Sonoma County tiger salamander or their critical habitat. Our concurrence is based on the determination that effects to Central California and Sonoma County tiger salamanders will be insignificant and discountable since impacts to these species or their critical habitat is unlikely, due to proposed projects only occurring in or near stream and riparian corridors. California tiger salamanders or their habitats should not be affected by these projects since the species primarily use ponds and vernal pools for breeding and grassland habitat for upland refugia habitat, both of which are not usually in proximity to anadromous fish-bearing streams. If it is determined that an individual project could adversely affect Central California or Sonoma County California tiger salamanders or their critical habitat, the project proponents will consult with the Sacramento Fish and Wildlife Office to determine appropriate avoidance and minimization measures and determine if additional consultation is needed.

Least Bell's Vireo

Least Bell's vireo may occur in Monterey, San Benito, and San Luis Obispo Counties, with the majority of occurrences noted along the Salinas River (CNDDB 2021). Although there are records of least Bell's vireo in the counties covered under this consultation, this species is known to be primarily concentrated in southern California (CNDDB 2021, Service 2006).

Effects to the species have the potential to occur if riparian vegetation occurs during the spring and summer, or if disturbance occurs within a 0.25-mile radius of known or potential vireo habitat. Removal of riparian vegetation during project activities typically does not occur; however, it is minimal if it does. Harvesting of willow branches for revegetation at restoration sites may disturb existing vireo habitat, and noise from heavy equipment has the potential to cause nesting birds to abandon nests; however, project-related impacts are anticipated to be temporary and will be minimized to avoid adverse effects to the species. Project activities would not degrade existing habitat appreciably, and many projects would include restoration of riparian corridors.

We concur with your determination that the proposed authorization may affect, but is not likely to adversely affect the least Bell's vireo and its habitat. Our concurrence is based on least Bell's vireos being relatively uncommon in the project counties and the low likelihood of disturbance to least Bell's vireos with implementation of the following measures:

a. Work shall not begin within one quarter mile of any site with known or potential habitat for the least Bell's vireo until after September 15.

b. Harvesting of willow branches at any site with potential or known habitat for the least Bell's vireo will not occur between March 1 and September 15. Harvesting of willow branches during this time shall be limited to only 25% of an individual plant.

c. The work window at individual work sites may be modified, if protocol surveys determine that nesting birds do not occur within 0.25 mile of the site during the breeding season.

d. CDFW will ensure that the grantee or responsible party is aware that sites containing willow branches that may be harvested will require additional considerations and conservation measures, and will ensure that the work site is inspected before, during, and after completion of the action item.

e. Projects that include conducting re-treatment of invasive plants by use of herbicides outside of September 16 – November 1, must follow the additional avoidance and minimization measures found in the biological assessment's Appendix A – Least Bell's Vireo Re-Treatment Minimization Measures.

f. If for some reason these mitigation measures cannot be implemented or the project activities proposed at a specific work site cannot be modified to prevent or avoid potential impacts to least Bell's vireo or their habitat, then activity at that work site shall be discontinued.

Southwestern Willow Flycatcher

The southwestern willow flycatcher may occur in projects throughout the action area, including central coastal counties, the southern end of the San Joaquin Valley, and east of the Sierra Nevada mountains. It breeds from May through September in riparian habitat alongside rivers, streams, and other wetlands.

Effects to southwestern willow flycatchers from project activities could include noise disturbances during the breeding season, and disturbance from harvesting of revegetation material. Noise from heavy equipment has the potential to cause nesting birds to abandon nests, and harvesting revegetation material could reduce habitat quality during the breeding season. Limiting this type of work to the fall and winter months would reduce the potential adverse effects.

We concur with your determination that the proposed authorization may affect, but is not likely to adversely affect the southwestern willow flycatcher. Our concurrence is based on the low likelihood of disturbance to southwestern willow flycatchers and implementation of the following measures:

a. Heavy equipment work shall not begin within one quarter mile of any site with known or potential habitat for the southwestern willow flycatcher until after September 15.

b. Prior to any work in areas where riparian habitat is present, a Service-approved biologist shall do a habitat assessment and determine whether the area within 500 feet of the project site is suitable for nesting by southwestern willow flycatchers. If not, work may proceed without further surveys. If the biologist determines that the area is suitable, a Service-approved biologist must monitor before and during the project to determine the status of the southwestern willow flycatchers within 500 feet of the project site.

c. The work window at individual work sites may be modified, if protocol surveys determine that nesting birds do not occur within 0.25 mile of the site during the breeding season.

d. Harvest of willow branches at any site with potential habitat for the southwestern willow flycatcher shall not occur between May 1 and September 15.

e. No more than 1/3 of any willow plant shall be harvested annually. Care shall be taken during harvest not to trample or over harvest the willow sources.

f. If any southwestern willow flycatchers are observed nesting within 500 feet of the project activities, work shall cease temporarily until it is determined that either the birds are not nesting, or young have fledged.

g. CDFW will ensure that the grantee or responsible party is aware of all site-specific conditions related to potential habitat for southwestern willow flycatchers, and will ensure that the work site is inspected pre-, during, and post-completion of the action item.

h. If these mitigation measures cannot be implemented or the project actions proposed at a specific work site cannot be modified to prevent or avoid potential impacts to southwestern willow flycatcher or their habitat, then activity at that work shall be discontinued.

Marbled Murrelet and its critical habitat

Marbled murrelets may be present in project areas within Humboldt, Mendocino, Sonoma, Marin, San Mateo, and Santa Cruz Counties. Project areas may be located within or near marbled murrelet breeding habitat; however, marbled murrelets nest in old-growth forests and projects will not remove or degrade suitable marbled murrelet breeding habitat. Effects to marbled murrelets from project activities would likely be limited to noise disturbances during the breeding season if activities are conducted from March to August. Noise from heavy equipment has the potential to cause nesting birds to abandon nests. Limiting this type of work to the fall and winter months would reduce the potential adverse effects.

We concur with your determination that the proposed authorization may affect, but is not likely to adversely affect the marbled murrelet or its critical habitat. Our concurrence is based on the low likelihood of disturbance to marbled murrelets or its critical habitat and implementation of the following measures:

a. Restoration work in areas considered by the Arcata and Ventura Fish and Wildlife offices shall not be conducted within 0.25-mile of occupied or un-surveyed suitable marbled murrelet habitat between March 24 and September 15. Restoration work in areas considered by the Sacramento Fish and Wildlife Office shall not be conducted within 0.25-mile of any occupied or un-surveyed suitable marbled murrelet habitat between November 1 and September 15.

b. The work window at individual work sites near suitable habitat may be modified, if protocol surveys determine that habitat quality is low, and occupancy is very unlikely.

c. If these mitigation measures cannot be implemented or the project actions proposed at a specific work site cannot be modified to prevent or avoid potential adverse effects to marbled murrelet or their habitat, then activity at that work site shall be discontinued.

d. For projects contained in streams and watersheds included in a Habitat Conservation Plan the mitigation measures contained within those Habitat Conservation Plans shall be followed.

Northern Spotted Owl and its critical habitat

None of the projects that will be covered under this project will remove, degrade, or downgrade northern spotted owl habitat. As a result, direct injury or mortality of northern spotted owl are discountable. We concur with your determination that the proposed authorization may affect, but is not likely to adversely affect the northern spotted owl and its critical habitat. Our concurrence is based on the low likelihood of disturbance to northern spotted owls or their critical habitat and implementation of the following measures:

a. Work with heavy equipment at any site within 0.25 miles of suitable habitat for the northern spotted owl shall not occur from November 1 to July 31 for projects in areas under the jurisdiction of the Sacramento Fish and Wildlife Office and from November 1 to July 9 for projects in areas under the jurisdiction of the Arcata Fish and Wildlife Office.

b. The work window at individual work sites may be advanced prior to July 9 or July 31 (corresponding to the different time constraints of the Sacramento and Arcata Fish and Wildlife office), if protocol surveys determine that suitable habitat is unoccupied.

c. If these mitigation measures cannot be implemented or the project actions proposed at a specific work site cannot be modified to prevent or avoid potential impacts to northern spotted owls or their habitat, then activity at that work site shall be discontinued and CDFW must reinitiate consultation with the Service.

d. For projects contained within streams and watersheds included in a Service Habitat Conservation Plan the mitigation measures contained within those Habitat Conservation Plans shall be followed.

Western Snowy Plover and its critical habitat

None of the activities proposed in RGP-12 will significantly degrade western snowy plover habitat and effects to habitat are expected to be discountable. We concur that the proposed project may affect, but is not likely to adversely affect the western snowy plover or its critical habitat. Our concurrence is based on the low likelihood of disturbance to snowy plovers or their critical habitat and implementation of the following measures:

a. No activities will be performed within 300 feet of an active western snowy plover nest or broods during the western snowy plover's breeding season, March 1 through September 14 (or as determined through surveys and approved by CDFW/Service).

b. Vehicles driving on levees and pedestrians/workers walking on recreational trails established prior to the start of the breeding season (which may continue) will remain at least 300 feet away from the western snowy plover nests and broods to the extent feasible, although because these trails are potentially already accessible to the public, nesting western snowy plovers are expected to continue to adjust the location of nesting based on their tolerance of distance from these trials.

c. If necessary, signage, temporary fencing (i.e., roped-off areas) or other markers will indicate areas that vehicles and pedestrians/workers shall avoid protecting nesting western snowy plovers, and project proponents shall enforce these closures.

d. Project personnel that must stop at a specific site for brief inspections, maintenance, or monitoring activities will remain 300 feet away from western snowy plover nests and broods.

e. If western snowy plover chicks are present and are foraging along any levee that will be accessed by vehicles (e.g., for construction, inspection, or access), vehicle use will be under the supervision of a qualified biologist to ensure that no chicks are present within the path of the vehicle.

f. To minimize impacts, work in and adjacent to potential western snowy plover nesting habitat will be conducted outside of the nesting season to the extent practicable.

g. If seasonal avoidance is not possible, surveys before and during construction will be conducted for nesting western snowy plovers, and appropriate buffers (determined by CDFW/Service) will be implemented between proposed project activities and nesting western snowy plovers.

Western Yellow-Billed Cuckoo

The western yellow-billed cuckoo may occur in suitable habitat throughout the action area. Cuckoos breed in dense riparian woodlands. They may nest and forage in tamarisk (*Tamarix* spp.), but there is usually a native riparian tree component within the occupied habitat (Halterman et al. 2011) and not just pure stands of tamarisk.

Effects to western yellow-billed cuckoos from project activities could include noise disturbances during the breeding season, and disturbance from harvesting of revegetation material. Noise from heavy equipment has the potential to cause nesting birds to abandon nests, and harvesting revegetation material could reduce habitat quality during the breeding season. Limiting this type of work to the fall and winter months would reduce the potential adverse effects.

We concur with your determination that the proposed authorization may affect, but is not likely to adversely affect the yellow-billed cuckoo. Our concurrence is based on the low likelihood of disturbance to yellow-billed cuckoos and implementation of the following measures:

a. Program activities that occur in known suitable breeding habitat (contiguous riparian habitat covering 50 acres or more) will not be conducted from June 1 to August 31.

b. If protocol surveys determine that no nesting western yellow-billed cuckoos occur within 0.25 mile of a specific project site, project activities at that site may commence prior to August 31.

c. Project activities will not remove or degrade suitable habitat for western yellow-billed cuckoo.

Point Arena Mountain Beaver

None of the projects that will be covered under this project will remove, degrade, or downgrade Point Arena mountain beaver habitat. As a result, direct injury or mortality of Point Arena mountain beaver is not likely and effects are likely to be insignificant and discountable.

We concur with your determination that the proposed project may affect, but is not likely to adversely affect the Point Arena mountain beaver. Our concurrence is based on the low likelihood of disturbance to the species and implementation of the following measures:

a. Within 500 feet of occupied habitat during the breeding season from December 15 through June 15 the following restrictions are in place:

    - Action and related activities shall be greater than 100 feet from occupied habitat.

- Noise-generating activates shall be limited to the use of hand tools and light power-tools (e.g., chainsaw, axe, etc.).
- No tools shall be used that require an air compressor.
- No power tools shall be operated while in direct contact with the ground.

Listed Plants

The work sites that may occur during the life of Regional General Permit for FRGP funded projects could potentially be within the range of a variety of rare plant species. Because of the large number of widely scattered work sites proposed, it is not feasible to survey individual work sites in advance and still be able to implement the restoration projects, due to time limits on the availability of restoration funds. Before work can proceed, a list of special status plant species that might occur at individual project work sites will be prepared and presented in each fiscal year's CEQA Mitigated Negative Declaration document for the program. Before a Notice to Proceed is given to the grantee to begin implementation work, all botanical surveys following the "Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities" shall be completed and produced to a project's CDFW grant manager. Experience with grant projects from previous years has shown that the potential for adverse impacts on rare plants at salmonid restoration work sites is very low. Few sites surveyed for rare plants between 1999 and 2019 were found to have rare plant colonies; disturbance of rare plants was avoided in all cases and will continue to be conducted as such.

We concur with your determination that the proposed authorization may affect, but is not likely to adversely affect any listed plant species. Our concurrence is based on the low likelihood of disturbance to listed plants or their habitats and implementation of the following measures:

a. A qualified biological consultant shall survey all work sites for rare plants prior to any ground disturbing activities. Rare plant surveys will be conducted following the Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities (CDFW, 2018).

b. If any special status plant species are identified at a work site, CDFW shall require one or more of the following protective measures to be implemented before work can proceed:

   - Fencing to prevent accidental disturbance of rare plants during construction;
   - On-site monitoring by a qualified biologist during construction to assure that rare plants are not disturbed; or
   - Redesign of proposed work to avoid disturbance of rare plants.

c. Plant surveys will also include any host plants for butterflies identified as occurring in the area either in the California Natural Diversity Database (CNDDB) or the official species list. These host plants are shown in Table 1 for each butterfly.

Table 1. Various listed butterfly species and their host plant species that require avoidance under the Program.

Butterfly Species	Host Plant Species
Mission Blue Butterfly (*Icaricia icarioides missionensis*) - Endangered	Silver Bush Lupine (*Lupinus albifrons*)
San Bruno Elfin Butterfly (*Callophrys mossii bayensis*) - Endangered	Stonecrop (*Sedum spathulifolium*)
Callippe Silverspot Butterfly (*Speyeria callippe callippe*) – Endangered	Johnny Jump Up (*Viola pedunculata*)
Myrtle’s Silverspot (*Speyeria zerene myrtleae*) – Endangered	Hookedspur Violet (*Viola adunca*)
Bay Checkerspot Butterfly (*Euphydryas editha bayensis*) - Threatened	Native Plantain (*Plantago erecta*)
Smith’s Blue Butterfly (*Euphilotes enptes smithi*) - Endangered	Buckwheat (*Eriogonum latifolium*) and Seacliff Buckwheat (*Eriogonum parvifolium*)

- If any host plant species are identified at a work site, CDFW shall require one or more of the following protective measures to be implemented before work can proceed:
    - Fencing to prevent accidental disturbance of larval host plants during construction;
    - On-site monitoring by a qualified biologist during construction to assure that larval host plants are not disturbed; and
    - Redesign of proposed work to avoid disturbance of larval host plants.
- If it becomes impossible to implement the project at a work site without impacts to larval host plants, then activity at that work site shall not proceed. If it becomes impossible to implement the project at a work site without adverse effects to rare plants, then activity at that work site shall be discontinued.
- CDFW shall ensure that the grantee or responsible party is aware of these site-specific conditions, and shall inspect the work site before, during, and after completion of the action item.

The remainder of this document provides our biological opinion on the effects of the proposed project on the California red-legged frog and its critical habitat, the California freshwater shrimp, the San Francisco garter snake, and the tidewater goby and its critical habitat.

CONSULTATION HISTORY

Date:	Description:
Apr 2021-Dec 2021:	The Service coordinated with CDFW and the National Marine Fisheries Service (NMFS) to discuss the proposed project and develop the biological assessment.
December 13, 2021:	The Service received the Corps' letter requesting consultation and CDFW's December 2021 Biological Assessment entitled "The California Department of Fish and Wildlife's Fisheries Restoration Grant Program's Renewal Biological Assessment for Regional General Permit 12".
Apr 2021-Mar 2022:	Various communications between the Service, CDFW and NMFS about the proposed project.

BIOLOGICAL OPINION

The purpose of this section 7 consultation is to evaluate the effects of the proposed action on listed species and designated critical habitat. After reviewing the proposed action with programmatic actions as proposed by the Corps, the Service has determined that the proposed action presents a programmatic action, as defined in 50 CFR § 402.2.

Description of the Proposed Action

Project Description

The proposed activities in CDFW's Fisheries Restoration Grant Program are designed to restore Southern Oregon/Northern California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*), Central California Coast (CCC) coho salmon (*O. kisutch*), California Coast (CC) Chinook salmon (*O. tshawytscha*), Northern California (NC) steelhead trout (*O. mykiss*), Central California Coast (CCC) steelhead trout (*O. mykiss*), and South-Central California Coast (S-CCC) steelhead trout (*O. mykiss*) habitat with the goal of increasing populations of wild anadromous fish in coastal streams and watersheds. Habitat restoration activities and practices, covered in more detail below, include but are not limited to fish passage projects, bank stabilization treatments, upslope road decommissioning or repair, water conservation and replacement or modification of culverts that are barriers to fish passage. Instream restoration activities will be implemented annually during the summer low-flow period, typically between June 15 and November 1.

The North Coast Coho Recovery Solicitation Proposal Solicitation Notice (NCCR PSN) is a one-time grant solicitation under CDFW's Cutting the Green Tape Initiative that will fund projects promoting the recovery of SONCC coho salmon and CCC coho salmon, with incidental benefits to other species occurring in the same watersheds. Habitat restoration activities and practices are similar in scope to projects funded under the Fisheries Restoration Grant Program and will also be conducted during the summer low-flow period.

Proposed habitat restoration actions would provide predator escape and resting cover, increase spawning habitat, improve upstream and downstream migration corridors, improve pool to riffle ratios, and add habitat complexity and diversity. Some structures would be designed to reduce sedimentation, protect unstable banks, stabilize existing slides, provide shade, and create scour pools.

Most stream and river fish habitat devices will be located out of the minimum flow channel (thalweg). Navigation will not be affected since most sites will be in headwater areas. None will be within sections of rivers that are considered navigable either legally or within the common meaning of the term.

Project Types

The Fisheries Restoration Grant Program has 20 individual project types covered under the program. The 20 project types are broken down into 10 implementation types and 10 non-implementation types. Only the 10 implementation project types covered under RGP-12 and the Project Design (PD), and Monitoring Watershed Restoration (MO) project types will be fully evaluated for the Biological Assessment. See the programmatic biological assessment for more detailed project descriptions, including best management practices for each project type.

- FP – Fish Passage at Stream Crossings
- HB – Instream Barrier Modification for Fish Passage
- HI – Instream Habitat Restoration
- HR – Riparian Restoration
- HS – Instream Bank Stabilization
- HU – Watershed Restoration (Upslope)
- WC – Water Conservation Measures
- WD - Water Measuring Devices (Instream and Water Diversion)
- PD – Project Design (100% design)
- MO – Monitoring Watershed Restoration (Large-scale and Project-scale)

Instream Habitat Improvements (HI)

Instream habitat structures and improvements are designed to provide refuge from predators, resting cover, increase spawning habitat, provide resting areas in migration corridors, improve pool-to-riffle ratios, and increase habitat complexity and diversity. Implementation of these types of projects may require the use of heavy equipment (i.e., self-propelled logging yarders, mechanical excavators, backhoes, etc.), however, hand labor will be used when possible. Specific techniques for instream habitat improvements are described in Volume I Part VII-Project Implementation of the CDFW Manual.

Instream habitat restoration includes the installation of boulder structures (boulder weirs; vortex boulder weirs; boulder clusters; and single and opposing boulder wing-deflectors), log and root wad structures (divide logs; digger logs; spider logs; engineered log jams; log weirs; upsurge weirs; single and opposing log wing-deflectors; and log, root wad and boulder combinations), off-channel and/or side channel habitat construction and floodplain connectivity and grading projects. Techniques and practices are identified in Volume I Part VII of the CDFW Manual. Techniques for placement of imported spawning gravel are identified in Volume I Part VII page VII-46 of the CDFW Manual.

Instream Barrier Modification for Fish Passage (HB)

Instream barriers are grade control structures (weirs), flashboard dams, small dams' debris basins, water diversion structures, log jams, beaver dams, waterfalls, chutes, landslides, tide gates, and log debris accumulations that prevent or impede the passage of adult and juvenile salmonids to preferred areas. Removing low-flow barriers, tide gates, small dams and Denali and Alaska steep-pass fishways; installing rock weirs to deepen low-flow impediments; notching grade control structures; placing baffles within concrete-lined sections of channel and installing fishways on small dams and on flood-control structures such as debris basins are ways to greatly improve the migration efforts of salmonids returning to natal streams.

Creation of beaver habitat and installation of beaver dam analogue structures, including installation of in-stream structures to encourage beaver dam building and shunting of flows onto floodplain surfaces may be designed in association with stream and riparian habitat projects.

In-channel structures consist of porous channel-spanning structures consisting of biodegradable vertical posts (beaver dam support structures) approximately 0.5 to 1 meter apart and at a height intended to act as the crest elevation of an active beaver dam. Variation of this restoration treatment may include post lines only, post lines with wicker weaves, construction of starter dams, reinforcement of existing active beaver dams, and reinforcement of abandoned beaver dams.

Beaver Habitat Restoration - The long-term goal of this category is to restore linear, entrenched, simplified channels to their previously sinuous, structurally complex channels that were connected to their floodplains. This will result in a substantial expansion of riparian vegetation and improved instream habitat. Beavers, which were historically prevalent in many watersheds, build dams that, if they remain intact, will substantially alter the hydrology, geomorphology, and sediment transport within the riparian corridor. Beaver dams will entrain substrate, aggrade the bottom, and reconnect the stream to the floodplain; raise water tables; increase the extent of riparian vegetation; increase pool frequency and depth; increase stream sinuosity and sediment sorting; and lower water temperatures.

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 the current land use (e.g., where high-tide backwater effects are of concern). Tide/flood gate replacement or retrofitting may 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 is not eligible for FRGP funding. The replacement of tide gates is eligible only if project proponents can demonstrate that such a replacement would increase or enhance ecological processes. Typical equipment used to implement the following projects in this activity are excavators, cranes, boats, barges, pumps, *Fish Passage at Stream Crossings (FP)*

Stream crossing barriers such as paved roads, unpaved roads, railroads, trails and paths, fair-weather Arizona crossings, bridges, and box, pipe, or concrete culverts and baffles limit or impede salmonid migration. By providing fish friendly crossings where the crossing width is at least as wide as the active channel, a culvert pass is designed to withstand a 100-year storm flow, or a crossing bottom is buried below the streambed creates access to migratory and spawning habitat. Examples include but are not limited to replacement of barrier stream crossing with bridges, bottomless arch culverts, embedded culverts, or fords.

Instream Bank Stabilization (HS)

Instream bank stabilization projects include stabilization of eroding, collapsing, or otherwise destabilized banks. Through boulder stream bank stabilization structures, log stream bank stabilization structures, tree revetment, native material revetment, mulching, revegetation, willow wall revetment, brush mattresses, brush check dams, brush check dams, waterbars, and exclusionary fencing increases bank stability reduces stream scour and bank failures during high flow event and decreases fine sediment ratios within streams and stream substrates. Reducing fine sediment in the waterway improves steelhead spawning habitat and increases survival of steelhead eggs and alevins within spawning gravels, reduces gill injury to steelhead caused by high concentrations of suspended sediment, reduces loss of, or reduction in size of pools from excess sediment deposition, and a more diverse and suitable macroinvertebrate forage base for juvenile steelhead.

Watershed Restoration [Upslope] (HU)

Upslope watershed restoration projects are designed to reduce sediment delivery to anadromous streams through road decommissioning, road upgrading, and storm proofing roads (replacing high risk culverts with bridges, installing culverts to withstand the 100-year flood flow, installing critical dips, installing armored crossings, and removing unstable sidecast and fill materials from steep slopes).

Riparian Habitat Restoration (HR)

Riparian restoration projects are designed to improve salmonid habitat through increased stream shading which lower stream temperatures, as well as increase future recruitment of woody debris to streams, increase bank stability and increase invertebrate forage production. Riparian habitat restoration projects will improve riparian habitat by increasing the number of plants and plant groupings per unit area, and typically include the following types of projects: natural regeneration, livestock exclusionary fencing, bioengineering, revegetation projects, tree revetment, slide stabilization, stream bank stabilization, boulder stream bank stabilization structures, log stream bank stabilization structures, mulching, willow wall revetment, willow siltation baffles, brush mattresses, check-dams, brush check-dams, waterbars and eradication of non-native, invasive vegetation species and revegetation with native endemic riparian species. In some cases, riparian revegetation is incorporated into streambank stabilization projects.

For projects which result in disturbance within the riparian corridor or other hydrologically linked upland areas that may deliver sediment to a class I or II channel, the grantee will be required to replant disturbed and compacted areas with native plant species at a ratio of 2 plants to 1 plant removed. The species used should be in the composition that will result in mature riparian vegetation found in the region. Unless otherwise specified in the agreement, the standard for success is 80% survival of plantings or 80% annual survival of ground cover for broadcast planting of seed after a period of three years. Exposed soils will be covered using CDFW approved techniques to prevent delivery of sediment to a stream (i.e., mulching/seeding).

Water Conservation Measures (WC)

Eligible water conservation projects are those that provide more efficient use of water extracted from stream systems and result in an increase in flows that benefit aquatic species. Off-channel water storage, changes in the timing or source of water supply, moving points of diversion, irrigation ditch lining, piping, stock-water systems, installation of efficiency irrigation systems, graywater, and rainfall collection systems, and agricultural tailwater recovery/management systems are included in this category when the water savings are quantified and dedicated for instream beneficial flows. CDFW will only fund water conservation projects that include an instream dedication of 100% of the water saved due to project implementation and in a manner to support fish during water limited seasons. The water savings for these projects must be quantified, include an instream dedication of 100% of the water saved due to project implementation and in a manner to support fish during water limited seasons, and shall dedicate to the stream for anadromous salmonid benefits through a mechanism such as a Forbearance Agreement, an Instream Flow Lease, or a formal dedication or transfer of water rights through Chapter 10, Section 1707 of the California Water Code (1707 petition).

Water Measuring Devices [Instream and Water Diversion] (WD)

Eligible water measuring device projects are those that will install, test, and maintain instream water diversion measuring devices. The project should be consistent with and contribute to the implementation of the California Water Action Plan or California Climate Strategy. Project designs must follow guidelines described in the Water Measurement Manual, third edition (United States Bureau of Reclamation): https://www.usbr.gov/tsc/techreferences/mands/wmm.html. The instream gauges must be installed so they do not impede fish passage in anadromous streams. The WD project type does not provide funding for monitoring or water management purposes although testing/rating of the measuring system may be allowed or required as a part of a funded agreement. A separate monitoring (MO) or planning (PL) proposal should be prepared for extensive or long-term monitoring purposes. Consideration of the intended use of the water measuring devices will be included in the technical merit and biological soundness evaluation of proposals in the WD category.

Water measuring device projects are designed to determine the amount of flow a particular stream can handle in order for a project to manage flow on a diversion. This type of program activity is expected to have little to no negative benefit on salmonids and other listed species populations and habitat. These effects are expected to be negligible due to the proposed activities typically occurring within diversion ditches where an increased mobilization of sediment is less likely to reach the stream channel. Projects conducted under this biological opinion only apply to water measuring device projects that will be conducted on non-fish bearing screened diversion canals. A project under this category attempting to perform work in a fish bearing stream shall seek separate consultation. Furthermore, if these projects require dewatering, dewatering mitigation measures shall be followed.

Project Design (PD)

Eligible proposals for developing project designs for restoration activities are those that would protect or improve habitat for salmonids (e.g., fish barrier modification or removal, bank stabilization, fish screens, water conservation). A PD proposal can be a feasibility study (less than 100% design delivered) or a design development project. A proposal that results in less than 100% design plans is eligible for Priority 3 funding and a proposal resulting in 100% design plans is eligible for Priority 1 funding. While these project types generally have no on-the-groundwork at this point, FRGP is including them due to the potential need for small levels of ground disturbance for geotechnical surveys (i.e., ground water wells) in order to produce the most scientifically sound designs for future implementation projects.

Monitoring Watershed Restoration (MO)

Eligible restoration monitoring projects are those which will address one or more of the following tasks:

1) Implementation Monitoring - assess grant compliance, assess implementation quality, and document the location and as-built condition of restoration features constructed.

2) Effectiveness Monitoring - determine if restoration treatment and features have produced the desired habitat response and/or physical watershed processes both at a worksite scale and/or watershed scale; or

3) Validation Monitoring - determine if restoration treatment and features have produced the desired ecological conditions and/or population response. Protocols for validation monitoring should follow those outlined in Protocols for Monitoring the Response of Anadromous Salmon and Steelhead to Watershed Restoration in California (Duffy 2006), which can be found on the FRGP Guidance Tools website.

<u>Changes to Project Type Activities</u>

While these activities have been addressed in the specific project types above, they are re-listed here to provide ease of clarification.

- Activities added due to tidal reach inclusion in the permit:
  - HI projects
    - i. Salt Marsh Remediation
      - a. Includes but not limited to the following: filling drainage channels, cattle exclusion fencing, planting of native salt-tolerant marsh plants, and elevation changes.

- Restoration of the tidal prism.
    - HB projects
        - i. Barrier removals or modification in tidal reaches
            - a. Tide gates, levees, head of tide dams, culverts, and other stream crossings.
    - FP Projects
        - i. Improvements of fish passage at stream crossings in tidal reaches
    - The remaining project types: HI, HR, HS, HU, WC, and WD would have no new activities added besides the ability to work in these tidally influenced areas or as in the case of HU areas that could directly affect tidal portions of these streams and rivers.
- Beaver Dam Analogs
    - These activities would be included under the project type HB and be implemented in accordance with the approved restoration manuals and their sections. This activity would only be funded in areas with known or potential American Beaver habitat. This would include the counties of Del Norte, Humboldt, Siskiyou, Trinity, and portions of the counties of Contra Costa, Glenn, Lake, Mendocino, Napa, San Benito, and Solano.

<u>Ineligible Projects under CDFW Grant Programs</u>

Projects that are immediately ineligible for funding within the FRGP include:

- Projects that are required mitigation or used for mitigation (CDFW requirement for program and CEQA/CESA requirement for permitting).
- Projects that are under an enforcement action by a regulatory agency (CDFW requirement for program and CEQA/CESA requirement for permitting).
- Installation of new fish ladders or maintenance of existing ladders.
- Projects that would require the installation of a flashboard dam or head gate to guarantee project performance.
- Contain the construction of concrete-lined channels of any sort.
- Implementation projects that do not restore, recover, or enhance either salmonid populations and/or habitat.

- Projects working within vernal pool habitat.
- Use of gabion baskets.
- Projects where the constructed habitat would be used as a point of water diversion.
- Projects that are likely to cause, for any covered species, a permanent net loss of habitat, permanent net loss of habitat function, or permanent net loss of functional value of designated or proposed critical habitat (e.g., the physical and biological features essential for the species' recovery and conservation).
- Projects that would result in any net loss of eelgrass resources.
- Placement of new tide gates where they did not previously exist.

Projects that are ineligible for permitting but could still acquire funding through the program include:

- Projects that will disturb or dewater more than 1000 contiguous feet of stream reach.
- Projects that will require the implementation of a fish screen.

Construction Duration

Projects funded through CDFW are required to complete all construction related activities within four field seasons from grant execution date. Projects must be completely closed out by their fifth year from their Proposal Solicitation Notice year. Instream restoration activities are required to be implemented annually during the summer low-flow period, typically between June 15 and November 1. Extensions to this work season can be granted if: 1) there is less than a 50% chance of 1.5 inches of rain predicted over any 24-hour period during the granted time extension, and 2) if CDFW determines and NMFS/Service confirm that an extension will not result in effects that go beyond those analyzed during the ESA consultation on the proposed action, either in type or magnitude.

Conservation Measures

General Measures for Protection of Biological Resources

General mitigation measures are implemented for all CDFW funded projects. Specific mitigation measures are identified for the various species found at or near the project sites. A CDFW grant manager is assigned to each project and is responsible for ensuring that all applicable general and specific mitigation measures are implemented and followed.

- All habitat improvements shall be done in accordance with techniques in approved restoration manuals for FRGP funded projects.
- The grantee shall have dependable radio or phone communication on-site to be able to report any accidents or fire that might occur.
- For all projects under CDFW, applicants must include, as part of supplemental documents, a plan describing the specific decontamination protocols proposed for use

before, during, and after the project to prevent the spread of invasive species. Restoration projects should not be vectors for invasive species, such as but not limited to New Zealand mud snail and Sudden Oak Death Syndrome (SODS). Personal field gear and heavy equipment working in the stream must be properly decontaminated before starting a project and before moving to a new location even within the same watershed. For general information on preventing the spread of invasive species, see CDFW's Invasive Species Program website. For decontamination protocols for SODS see the California Oak Mortality Task Force. For an example of an invasive species prevention plan those applicants must build off of, see the FRGP Guidance Tools website.

Timing

To avoid impacts to aquatic habitat the activities carried out in the restoration program typically occurs during the summer dry season where flows are low, or streams are dry. Work around streams is restricted to the period of June 15 through November 1 or the first significant rainfall, whichever comes first. Actual individual project start and end dates, within this timeframe, are at the discretion of the Department of Fish and Wildlife (i.e., on the Shasta River projects must be completed between July 1 and September 15 to avoid impacts to immigrating and emigrating salmonids). This is to take advantage of low stream flow and avoid the spawning and egg/alevin incubation period of salmon and steelhead.

- Upslope work generally occurs during the same period as stream work. Road decommissioning and other sediment reduction activities are dependent on soil moisture content. Non-jurisdictional upslope projects do not have seasonal restrictions in the Incidental Take Statement, but work may be further restricted at some sites to allow soils to dry out adequately. In some areas equipment access and effectiveness is constrained by wet conditions.

- The approved work window for individual work sites will be further constrained as necessary to avoid the nesting or breeding seasons of birds and terrestrial animals. At most sites with potential for raptor (including northern spotted owls (*Strix occidentalis caurina*)) and migratory bird nesting, if work is conditioned to start after July 9, potential impacts will be avoided, and no surveys will be required. For work sites that might contain nesting marbled murrelets (*Brachyrampus marmoratus*), the starting date will be September 16 in the absence of surveys. The work window at individual work sites could be advanced if surveys determine that nesting birds will not be impacted.

- For restoration work that may affect bank swallow (*Riparia riparia*) nesting habitat (such as removal or modification of bridges, culverts or other structures that show evidence of past swallow nesting activities), construction shall occur after August 31 to avoid the swallow nesting period. Suitable nesting habitat shall be netted prior to the breeding season to prevent nesting. Netting shall be installed before any nesting activity begins, generally prior to March 1. Swallows shall be excluded from areas where construction activities cause nest damage or abandonment.

- All project activities shall be confined to daylight hours.

Work Area: Spill & Sedimentation Prevention

- Projects shall not disturb or dewater more than 1,000 feet of contiguous stream reach.

- During all activities at project work sites, all trash shall be properly contained, removed from the work site(s), and disposed of regularly. Following construction, all trash and construction debris shall be removed from work areas.

- Staging/storage areas for equipment, materials, fuels, lubricants, and solvents, will be located outside of the stream's high-water channel and associated riparian area where it cannot enter the stream channel. Stationary equipment such as motors, pumps, generators, compressors, and welders located within the dry portion of the stream channel or adjacent to the stream, will be positioned over drip-pans. Vehicles will be moved out of the normal high-water area of the stream prior to refueling and lubricating. The grantee shall ensure that contamination of habitat does not occur during such operations. Prior to the onset of work, CDFW shall ensure that the grantee has prepared a plan to allow a prompt and effective response to any accidental spills. All workers shall be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur.

- The number of access routes and footpaths, number and size of staging areas, and the total area of the work site activity shall be limited to the minimum necessary to complete the restoration action while minimizing riparian disturbance without affecting less stable areas, which may increase the risk of channel instability. Existing roads shall be used to access work sites as much as practicable.

- All access routes, footpaths, and staging areas created during the project shall be replanted with native vegetation after the project's full construction has been finished to limit the effects to the habitat.

- The access and work area limits shall be identified with brightly colored flagging or fencing. Flagging and fencing shall be maintained in good repair for the duration of project activities. All areas beyond the identified work area limits shall not be disturbed.

- Any construction debris shall be prevented from falling into the stream channel. Any material that does fall into a stream during construction shall be immediately removed in a manner that has minimal impact to the streambed and water quality.

- Where feasible, the construction shall occur from the bank, or on a temporary pad underlain with filter fabric.

- Any work within the stream channel shall be performed in isolation from the flowing stream and erosion protection measures shall be in place before work begins.

- Installation of bridges, culverts, or other structures shall be done so that water flow is not impaired and upstream and downstream passage of fish is assured at all times. Bottoms of temporary culverts shall be placed at or below stream channel grade.

- Temporary fill shall be removed in its entirety prior to close of work-windows.

Dewatering

- Prior to dewatering, the best means to bypass flow through the work area to minimize disturbance to the channel and avoid direct mortality of fish and other aquatic invertebrates shall be determined.

- If there is any flow when work will be done, the grantee shall construct coffer dams upstream and downstream of the excavation site and divert all flow from upstream of the upstream dam to downstream of the downstream dam.

- No heavy equipment shall operate in the live stream, except as may be necessary to construct coffer dams to divert stream flow and isolate the work site.

- Coffer dams may be constructed with clean river run gravel or sandbags and may be sealed with sheet plastic. Upon project completion, sandbags and any sheet plastic shall be removed from the stream. Clean river run gravel may be left in the stream channel, provided it does not impede stream flow or fish passage and conforms to natural channel morphology without significant disturbance to natural substrate.

- Dewatering shall be coordinated with a Service-approved biologist to perform fish and wildlife relocation activities.

- The length of the dewatered stream channel and the duration of the dewatering shall be kept to a minimum and shall be expected to be less than 1,000 contiguous feet.

- When bypassing stream flow around the work area, stream flow below the construction site shall be maintained similar to the unimpeded flow at all times.

- The work area shall be periodically pumped dry of seepage. Pumps shall be placed in flat areas, away from the stream channel. Pumps shall be secured by tying off to a tree or staked in place to prevent movement by vibration. Pump intakes shall be covered with 0.125-inch mesh to prevent entrainment of fish or amphibians that failed to be removed. Pump intakes shall be periodically checked for impingement of fish or amphibians and shall be relocated according to the approved measured outline for each species below.

- If necessary, flow shall be diverted around the work site, either by pump or by gravity flow, the suction end of the intake pipe shall be fitted with fish screens meeting CDFW and NOAA criteria to prevent entrainment or impingement of small fish. Any turbid water pumped from the work site itself to maintain it in a dewatered state shall be disposed of in an upland location where it will not drain directly into any stream channel.

- Species shall be excluded from the work area by blocking the stream channel above and below the work area with fine-meshed net or screen. Mesh shall be no greater than 1/8-inch diameter. The bottom edge of the net or screen shall be completely secured to the channel bed to prevent fish from reentering the work area. Exclusion screening shall be placed in areas of low water velocity to minimize fish impingement. Screens shall be regularly checked and cleaned of debris to permit free flow of water.

- Where the disturbance to construct coffer dams to isolate the work site would be greater than to complete the action (for example, placement of a single boulder cluster), the action shall be carried out without dewatering and fish relocation. Furthermore, measures shall be put in place immediately downstream of the work site to capture suspended sediment. This may include installation of silt catchment fences across the stream, or placement of a filter berm of clean river gravel. Silt fences and other non-native materials will be removed from the stream following completion of the activity. Gravel berms may be left in the stream channel provided it does not impede stream flow or fish passage and conforms to natural channel morphology without significant disturbance to natural substrate.

Species Relocations

- All electrofishing will be conducted according to NMFS Guidelines for Electrofishing Waters Containing Salmonids listed under the Endangered Species Act (2000) and the documents provided by the Pacific Lamprey Conservation Initiative found in section 2.8.3 of the BA.

- Any project looking to conduct electrofishing within brackish waters will need to submit a plan to FRGP for approval by NOAA and the Service before work may commence. This plan must also show that the individual project will be using the correct specialized rods and attachments for work in high conductivity waters.

- Water temperature, dissolved oxygen, and conductivity shall be recorded along with electrofishing settings.

- Prior to finalization of relocation/dewatering plans, bathymetric and abiotic (i.e., dissolved oxygen, temperature) surveys should be conducted to determine the best method to avoid take.

- Dissolved oxygen (DO) along with air/water temperatures should be recorded periodically before/during relocation activities.

- Optimal DO for salmonid survival is between 3ppm to 8ppm. If DO at the relocation site is at the lower range, extra care shall be taken to relocate the salmonids and other species.

- In regions of California with high summer air temperatures, perform relocation activities either during morning periods or earlier in the season when temperatures are low.

- Prior to relocation/dewatering a clear layout of personnel responsibilities and procedures in case complications arise will be determined and made available to all workers and agencies.

- Determine the most efficient means for capturing fish. Complex stream habitat generally requires the use of electrofishing equipment, whereas in outlet pools, fish may be concentrated by pumping water out of the pool and then seining or dip netting fish. For both stream and pool habitat: boat-based electrofishing, backpack electrofishing and/or seining methods should be considered along with site bathymetry and bed material to provide the most effective capture strategy. An example is choosing electrofishing methods over seine nets due to a pond with an irregular bottom.

- Stream bypass systems should be inspected daily when in place to confirm they are operating as intended. If a stream bypass system is not operating as intended and is at risk of accidental take it shall be immediately restored.

- Prior to project implementation, the lead qualified biologist in charge of the relocation activity shall visit the project site(s).

- Any equipment entering the active stream (for example, in the process of installing a cofferdam) shall be preceded by an individual on foot to displace wildlife and prevent them from being crushed.

- If any non-special status wildlife is encountered during the course of construction, said wildlife shall be allowed to leave the construction area unharmed, and shall be flushed, hazed, or herded in a safe direction away from the project site. "Special status wildlife" is defined as any species that meets the definition of "endangered, rare, or threatened species" in § 15380, Article 20 in Title 14 of the California Code of Regulations, also known as the "CEQA Guidelines".

- For any work sites containing western pond turtles (*Actinemys marmorata*), salamander species, foothill yellow-legged frogs (*Rana boylii*), California red-legged frogs (*Rana draytonii*), or tailed frogs (Genus *Ascaphus*), the grantee shall provide to the CDFW grant manager for review and approval, a list of the exclusion measures that will be used at their work site to prevent take or injury to any individual pond turtles, salamanders, or frogs that could occur on the site. The grantee shall ensure that the approved exclusion measures are in place prior to construction. Any turtles or frogs found within the exclusion zone shall be moved to a safe location upstream or downstream of the work site, prior to construction.

- Any red tree vole (*Arborimus longicaudus*) nests encountered at a work site(s) shall be flagged and avoided during construction.

In-water Pile Driving

Pile driving will mostly be conducted in, or adjacent to, dry channels. If pile driving cannot occur in a dry channel, species will be removed using the techniques described within the above section and project applicants shall implement the following measures to avoid and minimize potential adverse effects that could otherwise result from in-water pile driving activities:

- Project applicants shall develop a plan and hydroacoustic analysis confirming that underwater expected sound pressure levels are below thresholds for peak pressure and accumulated sound exposure levels for pile-driving activities to minimize impacts to listed species and will allow sufficient time in the planning and construction schedule for coordination with regulatory agencies. If water depths allow for hydrophones, pile driving will cease before injury levels are exceed regardless of what kind of attenuation, dewatering, or fish relocation measures are implemented. Threshold levels established by NMFS are:

1. Peak pressure = 206 dB peak

2. Accumulated sound exposure levels (cSEL) = 183 dB cSEL

3. Accumulated sound exposure levels for fish over 2g = 187 dB cSEL

- Pile driving shall occur during the established/approved in-water and general work windows described above.

- Sheet piling shall be driven by vibratory or nonimpact methods (i.e., hydraulic) that result in sound pressures below threshold levels to the extent feasible.

- Pile driving activities shall occur during periods of reduced currents. Pile-driving activities shall be monitored to ensure that the effects of pile driving on protected species are minimized. If any stranding, injury, or mortality to listed species is observed, NMFS/Service shall be immediately notified, and in-water pile driving shall cease. Vibratory hammers, rather than impact hammers, shall be used whenever possible.

- If pile driving is implemented in, or adjacent to, a wetted stream, monitoring of listed species shall occur during pile-driving activity to ensure no species stranding or mortality occurs.

- Sound monitoring will be done, if monitoring is possible due to water depth, to ensure to cSEL injury levels are not exceeded. If levels are met, then pile driving shall cease for a minimum of 12 hours. Attenuation measures include the following:

    i. A cushioning block could be used between the hammer and pile.

    ii. A confined or unconfined air bubble curtain shall be used.

The 183 dB cSEL level will be used unless, through the variance process defined below, salmonids under 2 grams are determined to be absent. The number of piles, type/size of the piles, estimated sound levels caused by the driving, how many piles will be driven each day, and any other relevant details on the nature of the pile driving activity must be included in the project application. See Technical Guidance for the Assessment of Hydroacoustic Effects of Pile Driving on Fish (2020) Caltrans Hydroacoustic Manual for more information. Proposed projects that would exceed the 183 dB cSEL level would not be eligible for coverage under this permit and would require separate Section 7 consultation.

Herbicides

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

- Whenever feasible, reduce vegetation biomass by mowing, cutting, or grubbing it before applying herbicide to reduce the amount of herbicide needed.

- Chemical control of invasive plants and animals will only be used when other methods are determined to be ineffective or infeasible. Herbicide use will be evaluated on a project-by-project basis with consideration of (and preference given toward) integrated pest management (IPM) strategies wherever possible. See University of California statewide IPM Program for guidance documents. Chemical use is restricted in accordance with approved application methods and BMPs designed to prevent exposure to non-target areas and organisms. Any chemical considered for control of invasive species must adhere to all regulations, be approved for use in California, its application must adhere to all regulations per the California Environmental Protection Agency, and it must be applied by a licensed applicator under all necessary state and local permits. Use herbicides 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 a lower rate is needed to reduce non-target impacts. Treat only the minimum area necessary for effective control. Soil-activated herbicides can be applied as long as directions on the label are followed. FRGP staff will recommend project proponents seek the advice of a Pest Control Advisor (PCA) if they are unfamiliar with the best chemical choices and combinations for their project, even if they are only planning to use the choices put forward in this biological assessment. If the project proponent is experienced with the use of certain chemicals and chemical mixtures, this extra step may not be necessary.

- 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.

- The licensed pesticide applicator will keep a record of all plants/areas treated, amounts and types of herbicides used, and dates of application, and pesticide application reports must be completed within 24 hours of application and submitted to applicable agencies for review. Wind and other weather data will be monitored and reported for all pesticide application reports. For more details on herbicides that are approved for these projects, see the BA.

2.8.3.2 Specific Measures for Service jurisdictional species

California Freshwater Shrimp

The range of the California freshwater shrimp (CFS) includes Marin, Napa, and Sonoma counties, excluding the Gualala River watershed. Therefore, the potential for impacts to CFS shall be mitigated by complying with all of the mandatory terms and conditions associated with incidental take authorized by the U.S. Fish and Wildlife Service. The CDFW proposes to implement the following measures to minimize adverse effects to the California freshwater shrimp and its habitat.

a. Project activities in potential shrimp habitat shall be restricted to the period between July 1 and November 1.

b. At least 15 days prior to the onset of activities, CDFW shall submit the name(s) and credentials of biologists who will conduct activities specified in the following measures to the Service. The grantee shall implement any additional conservation measures requested by CDFW and/or the Service.

c. The CDFW shall be notified at least one week in advance of the date on which work will start in the stream, so that a qualified CDFW biologist can monitor activities at the work site. All work in the stream shall be stopped immediately if it is determined by CDFW that the work has the potential to adversely impact shrimp or its habitat. Work shall not recommence until CDFW is satisfied that there will be no impact on the shrimp.

d. Where appropriate, a Service-approved CDFW biologist will survey each site for shrimp before allowing work to proceed and prior to issuance of a Streambed Alteration Agreement. All overhanging vegetation, undercut banks, and tree roots will be surveyed with a butterfly net or fish net.

e. Prior to the onset of work at a work site that may contain shrimp, the Service-approved CDFW biologist shall conduct a training session for all construction personnel. At a minimum, the training shall include a description of the shrimp and its habitat, the importance of the shrimp and its habitat, the general measures that are being implemented to conserve the shrimp as they relate to the work site, and the work site boundaries where construction may occur.

f. Only Service-approved biologists shall participate in the capture, handling, and monitoring of shrimp. CDFW shall report annually on the number of captures, release and injuries/mortality and agrees to modify capture/release strategy with Service staff as needed to prevent adverse effects.

g. In site locations where shrimp are present, CDFW will require the grantee to implement the mitigation measures listed:

    - Equipment work shall be performed only in riffle, shallow run, or dry habitats, avoiding low velocity pool, and run habitats occupied by shrimp, unless shrimp are relocated according to the protocol described below. “Shallow” run habitat is defined as a run with a maximum water depth, at any point, less than 12-inches, and without undercut banks or vegetation overhanging into the water.

- Hand placement of logs or rocks shall be permitted in pool or run habitat in stream reaches where shrimp are known to be present, only if the placement will not adversely affect shrimp or their habitat.

- Care shall be taken during placement or movement of materials in the stream to prevent any damage to undercut stream banks and to minimize damage to any streamside vegetation. Streamside vegetation overhanging into pools or runs shall not be removed, trimmed, or otherwise modified.

- No log or rock weirs (including vortex rock weirs) or check dams shall be constructed that would span the full width of the low flow stream channel. Vegetation shall be incorporated with any structures involving rocks or logs to enhance migration potential for shrimp.

- No dumping of dead trees, yard waste or brush shall occur in shrimp streams, which may result in oxygen depletion of aquatic systems.

h. If in the opinion of the Service-approved biologist, adverse effects to shrimp would be further minimized by moving shrimp away from the project site, the following procedures shall be used:

   - A second survey shall be conducted within 24 hours of any construction activity and shrimp shall be relocated to the nearest suitable habitat. Shrimp shall be moved while in the net or placed in buckets containing stream water. Stress and temperature monitoring of shrimp shall be performed by the Service-approved biologist. Numbers of shrimp and any mortalities or injuries shall be identified and recorded. Shrimp habitat is defined as reaches in low elevation (less than 116 m) and low gradient (less than one percent) streams where banks are structurally diverse with undercut banks, exposed fine root systems, overhanging woody debris or overhanging vegetation.

   - When no other habitat exists on a landowner's property, the shrimp shall be held in suitable containers with site water and released as soon as possible. Containers shall be placed in the shade.

i. If moving the shrimp out of the work area cannot be accomplished, and other avoidance measures have been deemed inappropriate, CDFW shall drop activities at the work site from the project.

j. A Service-approved CDFW biologist shall be present at the work site until such time as all removal of shrimp, instruction of workers, and habitat disturbance associated with the restoration project have been completed. The Service-approved biologist shall have the authority to halt any action that might result in the loss of any shrimp or its habitat. If work is stopped, the Service-approved biologist shall immediately notify CDFW and the Service.

k. If a work site is temporarily dewatered by pumping, intakes shall be completely screened with wire mesh no larger than 0.2-inch to prevent shrimp from entering the pump system. Water shall be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow shall be removed in a manner that would allow flow with the least disturbance to the substrate.

l. A Service-approved biologist shall permanently remove from within the project work site, any individuals of exotic species, such as bullfrogs, centrarchid fishes, and non-native crayfish, to the maximum extent possible. The grantee shall have the responsibility that such removals are done in compliance with CDFW.

m. Invasive non-native vegetation that provides shrimp habitat and is removed as a result of Program activities shall be replaced with native vegetation that provides comparable habitat for the shrimp. Re-vegetated sites shall be irrigated as necessary until vegetation is established. Re-vegetated sites shall be monitored until shading and cover achieves 60% of pre-project shading and cover and for a minimum of five years.

California Red-Legged Frog

Projects funded under FRGP will not remove or degrade California red-legged frog habitat; however, precautions shall be required at these sites to avoid the potential for take of frogs while using heavy equipment. The potential for effects to California red-legged frog will be mitigated by complying with all of the mandatory terms and conditions associated with incidental take authorized by the Service Biological Opinions. CDFW shall implement the following measures to minimize adverse effects to the frog and its habitat.

a. Project activities in potential red-legged frog habitat shall be restricted to the period between July 1 and October 15.

b. At least 15 days prior to the onset of project activities, CDFW shall submit the names(s) and credentials of biologists who would conduct activities specified in the following measures. No project activities shall begin until CDFW has received written approval from the Service that the biologist(s) is qualified to conduct the work.

c. Service-approved biologist(s) who handle red-legged frogs shall ensure that their activities do not transmit diseases. To ensure that diseases are not conveyed between work sites by the Service-approved biologist, the fieldwork code of practice developed by the Declining Amphibian Populations Task Force shall be followed at all times.

d. A CDFW monitoring plan shall be developed to determine the level of incidental take of red-legged frogs associated with the Restoration Program funded activities in the area. The monitoring plan must include a standardized mechanism to report any observations of dead or injured red-legged frogs to the appropriate Corps and Service offices.

e. A Service-approved biologist shall survey the project site at least two weeks before the onset of activities. If red-legged frogs are found in the project area and these individuals are likely to be killed or injured by work activities, the Service-approved biologist will allow sufficient time to move them from the site before work activities resume. Only Service-approved biologists will participate in activities with the capture, handling, and monitoring of red-legged frogs.

f. Before any project-related activities, the approved biologist must identify appropriate areas to receive red-legged frog adults and tadpoles from the project areas. These areas must be in proximity to the capture site, contain suitable habitat, not be affected by project activities, and be free of exotic predatory species (e.g., bullfrogs, crayfish) to the best of the approved biologist's knowledge.

g. Prior to the onset of project activities, a Service-approved biologist shall conduct a training session for all construction personnel. At a minimum, the training shall include a description of the red-legged frog and its habitat, the importance of the red-legged frog and its habitat, the general measures that are being implemented to conserve the red-legged frog as they relate to the project, and the boundaries within which the project may be accomplished. Brochures, books, and briefings may be used in the training session, provided that a qualified person is on hand to answer any questions.

h. A Service-approved biologist shall be present at the work site until such time as removal of red-legged frogs, instruction of workers, and habitat disturbance has been completed. The Service-approved biologist shall have the authority to halt any action that might result in impacts that exceed the levels anticipated by the Corps and Service during review of the proposed action. If work is stopped, the Corps and the Service shall be notified immediately by the Service-approved biologist or on-site biological monitor.

i. If red-legged frogs are found and these individuals are likely to be killed or injured by work activities, the Service-approved biologists must be allowed sufficient time to move them from the site before work activities resume. The Service-approved biologist must relocate the red-legged frogs the shortest distance possible to one of the predetermined areas. The Service-approved biologist must maintain detailed records of any individuals that are moved (e.g., size, coloration, any distinguishing features, photographs (digital preferred) to assist in determining whether translocated animals are returning to the point of capture. Only red-legged frogs that are at risk of injury or death by project activities may be moved.

j. If a work site is to be temporarily dewatered by pumping, intakes shall be completely screened with wire mesh not larger than 0.125 inch to prevent red-legged frogs from entering the pump system. Water shall be released or pumped downstream at an appropriate rate to maintain down stream flows during construction activities and eliminate the possibility of ponded water. Upon completion of construction activities, any barriers to flow shall be removed in a manner that would allow flow to resume with the lease disturbance to the substrate.

k. Ponded areas shall be monitored for red-legged frogs that may become entrapped. Any entrapped red-legged frog shall be relocated to a predetermined receiving area by a Service-approved biologist.

l. A Service-approved biologist will permanently remove from the project area, any individuals of exotic species, such as bullfrogs (*Rana catesbeiana*), centrarchid fishes, and non-native crayfish to the maximum extent possible. The biologist will have the responsibility to ensure that their activities are in compliance with the Fish and Game Code.

m. If these mitigation measures cannot be implemented or the project activities proposed at a specific work site cannot be modified to prevent or avoid potential impacts to

California red-legged frog or its habitat, then project activity at that work site shall be discontinued.

San Francisco Garter Snake

Projects funded under FRGP will not remove or degrade San Francisco garter snake habitat; however, precautions shall be required at these sites to avoid the potential for take of garter snakes while using heavy equipment. The potential for impacts to San Francisco garter snakes will be mitigated by complying with all of the mandatory terms and conditions associated with incidental take authorized by the Service, Biological Opinions. CDFW shall implement the following measures to minimize adverse effects to the San Francisco garter snake and its habitat.

a. A service approved biologist will conduct preconstruction surveys and monitor for San Francisco garter snakes prior to implementation of project activities. If San Francisco garter snakes are identified at a project site, work will be halted. If the identified animal(s) do not leave the project area of their own volition, the Service and CDFW will be contacted to determine appropriate actions. Only Service-approved biologists will participate in activities associated with the capture, handling, or relocation of San Francisco garter snakes.

b. Exclusion fencing shall be established around staging areas and soil stockpile areas. Exclusion fencing shall include escape funnels and the lower edge of the fence shall be buried at least four (4) inches to prevent burrowing animals from tunneling under the fence. Exclusion fence posts will be placed on the inside to prevent snakes from being able to climb into the project site.

c. The Service-approved biologist will conduct daily inspections of the project work area, staging area, and the perimeter of any exclusion fencing prior to the commencement of construction activities. Upon completion equipment or materials may be moved onto the work site and project activities may commence with a Service-approved monitor.

d. The exclusion fencing will remain in operating conditions for the duration of the project. The biological monitor shall daily inspect the integrity of the exclusion fencing to ensure there are no gaps, tears, or damage. Maintenance of the fencing shall be conducted as needed. Any necessary repairs to the fencing shall be completed within 24 hours of the initial observance of the damage.

e. A Service-approved biological monitor will be on-site while project activities are being conducted. The monitor will walk in from of equipment to ensure San Francisco garter snakes are not crushed.

f. Vegetation removed shall be kept within the exclusion fencing or placed into a disposal vehicle and removed from the project site. Vegetation will not be piled on the ground outside fencing unless it is later transferred, piece by piece, under the direct supervision of the Service-approved biologist.

g. Soil will not be stockpiled unless it is on a paved surface or an area where burrows are absent. The Service-approved biologist will approve such locations within the defined work area.

h. If San Francisco garter snakes are found on site, the construction contractor shall stop work and contact the Service immediately and allow the San Francisco garter snakes to leave on its own volition.

i. Prior to work, all burrows will be flagged and avoided to prevent their collapse.

j. All workers will check stockpiled construction materials, and under equipment to be moved for presence of wildlife sheltering within them prior to use.

k. Any vehicle parked on site for more than 15 minutes will be inspected before it is moved to ensure that San Francisco garter snakes have not moved under the vehicle.

l. The Service-approved biological monitor shall have the responsibility and authority of stopping the project if any crews or personnel are not complying with the above measures.

Tidewater Goby

While all of the work proposed under this program will enhance habitat for tidewater goby, projects that will be proposed under this permit could involve instream work in their habitat. In order to avoid any potential for negative impacts to this species, the following measures will be implemented:

a. Construction activities at stream crossings will only occur between June 15 and October 31 to avoid or minimize adversely affecting tidewater goby and to minimize soil compaction and sediment transport.

b. Equipment will not be operated directly within tidal waters or stream channels of flowing streams.

c. Work will be done during low tide when no water or fish are present, to temporarily prevent tidewater goby from gaining access to the vicinity of the work area. If water is present, the work area will be seined, and a fish barrier installed to isolate the work area. At this time, gobies are susceptible to being injured or crushed by workers while they are entangled in or being removed from netting. In order to minimize potentially adverse effects to gobies, all translocation/removal of tidewater gobies will be conducted by qualified biologists under a scientific recovery permit pursuant to section 10(a)(1)(A) of the Act.

d. The temporary fish barrier will be removed after work is completed.

e. Silt fences will be deployed at culvert removal areas to prevent any sediment from flowing into the creek or wetted channels. If the silt fences are not adequately containing sediment, construction activity will cease until remedial measures are implemented that prevents sediment from entering the waters below.

f. All exposed surfaces will be slash-packed with native vegetation and planted with willow sprigging when the work has been completed.

g. Construction materials, debris, or waste will not be placed or stored where it may be allowed to enter into or be placed where it may be washed by rainfall into waters of the U.S./State.

h. Turbid water will be contained and prevented from being transported in amounts that are deleterious to fish, or in amounts that could violate state pollution laws. Silt fences or water diversion structures will be used to contain sediment. If sediment is not being contained adequately, as determined by visual observation, the activity will cease.

i. Designated areas will be used for equipment refueling. If equipment must be washed, washing will occur where wash water cannot flow into wetlands or waters of the U.S./State.

j. Best Management Practices (BMPs) will be implemented to prevent entry of storm water runoff into the project site, the entrainment of excavated contaminated materials leaving the site, and to prevent the entry of polluted storm water runoff into coastal waters during the transportation and storage of excavated materials.

<u>Administration of this Programmatic Biological Opinion</u>

This programmatic consultation will be implemented upon determination by the Corps that a proposed project that qualifies for authorization under Corps RGP-12 or otherwise meets the suitability set forth in this document as required by the implementing regulations for section 7 of the Act. The approval and determination process for CDFW for proposed Program projects is extensive and involves a Pre-application Review, as well as Technical Review, Regional Ranking, and Selection Panel process. The Pre-application Review verifies that the project is eligible under the solicitation, that environmental review (permitting and California Environmental Quality Act) pathways are appropriate, and that the project is likely to be completed on time. Reviewers look at whether the proposal demonstrates consistency with a recovery action specified in an authoritative, publicly available coho recovery plan. After passing Pre-application Review, proposals are assigned to at least three technical reviewers, primarily composed of CDFW scientists and engineers, at least one of whom must have local knowledge of the project area. After receiving technical scores, the CDFW regions provide input on project priority and quality (Regional Rankings), and CDFW convenes a Selection Panel composed of Regional Managers and executive staff to develop a list of projects recommended for funding. This list is then sent to CDFW's Director, who makes the final determination on funding. This process will determine the final list of projects that are sent to the Service for approval.

Each year on March 15, CDFW will provide to the Corps, Service, and NMFS a notification list detailing new and ongoing projects that are proposed or currently working under RGP-12. The notification list will include the following information: Project application identification number, FRGP grant number, project type, grant status, project title, project description, project applicant, county, CDFW region, Service/NMFS office jurisdiction, HUC-8 & HUC-10, stream(s), CDFW grant manager, latitude and longitude, proposed work start and end dates for that year, overall stream length treated (miles), waterbody impacted (riparian, instream, or upslope), any additional notes needed for the individual project.

Upon receipt of the appropriate information, the Service will review the provided list of projects. If the Service does not concur that all of the listed projects are appropriate to be covered under this programmatic biological opinion, the Service will notify the Corps and CDFW in writing within 90 days and provide details on which projects are not appropriate. In these cases, the Service will require separate section 7 consultations for those projects that are deemed not appropriate to be covered under this biological opinion.

The action area of this programmatic biological opinion overlaps with many other mechanisms that authorize incidental take of listed species such as Habitat Conservation Plans or other programmatic biological opinions. The applicant may seek incidental take authorization through one of these other mechanisms for projects that may affect the species, provided the sponsoring agency determines the applicant's project meets the criteria for inclusion under their respective mechanism, and subject to Service guidance and approval. At the Service's discretion, proposed actions that do not meet the suitability criteria for this programmatic biological opinion may still be covered, if the complete implementation of appropriate additional conservation measures sufficiently reduces the effects of the action or that the project has minimal effects that are consistent with the intent of this programmatic biological opinion.

This programmatic biological opinion is effective for a period of 5 years from the date of issuance and can be extended if deemed appropriate by both agencies. The Service will review this programmatic consultation, as appropriate, to ensure that its application is consistent with the intended criteria.

<u>Reporting</u>

Each year after implementation season ends on November 1, CDFW Grant Managers input implementation metrics into WebGrants that is then QA/QC'd. After data is validated, CDFW and Pacific States Marine Fisheries Commission staff compile the metrics into annual reports to both the Service and NMFS. In previous iterations of RGP-12, these reports were due on January 31 to the Service and March 1 to NMFS of each year. Going forward CDFW is proposing to send both reports jointly to the Service, NMFS, and the Corps on March 1 of each year.

Data to be included in the reports is as follows for each:

A table documenting the number of species killed, injured, and handled during each project's relocation efforts, along with each project's location, status, and relocation metrics regarding when and where each event occurred. The reports also will include a summary of how the terms and conditions of the biological opinion and the protective measures worked. Lastly, the report will include any suggestions of how the protective measures could be revised to improve conservation of species while facilitating compliance with the Act.

<u>Action Area</u>

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." For the proposed project, the action area encompasses areas covered under the RGP 12 jurisdiction, within the Corps' San Francisco District in central and northern coastal California. All projects would be located within this district which includes the Counties of Del Norte, Siskiyou, Humboldt, Trinity, Mendocino, Sonoma, Napa, Marin, San Francisco, San Mateo, Santa Cruz, Santa Clara, Monterey, and San Benito; the western portions of Solano, Contra Costa, and Alameda Counties; and the inland (Salinas River watershed) portion of San Luis Obispo County.

These areas are covered by three Service offices, and their respective jurisdictions are show below.

Arcata Fish & Wildlife Office: Del Norte, Humboldt, Trinity, Mendocino, and portions of Siskiyou Counties.

Sacramento Fish & Wildlife Office: Sonoma, Napa, Marin, San Francisco, San Mateo, Santa Clara, and the western portions of Solano, Contra Costa and Alameda Counties.

Ventura Fish & Wildlife Office: Santa Cruz, Monterey, San Benito, and the inland portion (Salinas River watershed) of San Luis Obispo County, except for an area in the southeast of the county.

Analytical Framework for the Jeopardy Determination

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

The jeopardy analysis in this biological opinion considers the effects of the proposed federal action, and any cumulative effects, on the rangewide survival and recovery of the listed species. It relies on four components: (1) the *Status of the Species*, which describes the current rangewide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which analyzes the current condition of the species in the action area without the consequences to the listed species caused by 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*, which determines all consequences to listed species that are caused by the proposed federal action; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-federal activities in the action area on the species. The *Effects of the Action* and *Cumulative Effects* are added to the *Environmental Baseline* and in light of the status of the species, the Service formulates its opinion as to whether the proposed action is likely to jeopardize the continued existence of the listed species.

Analytical Framework for the Adverse Modification Determination

Section 7(a)(2) of the Act requires that federal agencies insure that any action they authorize, fund, or carry out is not likely to destroy or to adversely modify designated critical habitat. A final rule revising the regulatory definition of "destruction or adverse modification" (DAM) was published on August 27, 2019 (84 FR 44976). The final rule became effective on October 28, 2019. The revised definition states:

> "*Destruction or adverse modification* means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species."

The DAM analysis in this biological opinion relies on four components: (1) the *Status of Critical Habitat*, which describes the current rangewide condition of the critical habitat in terms of the key components (i.e., essential habitat features, primary constituent elements, or physical and biological features) that provide for the conservation of the listed species, the factors responsible for that condition, and the intended value of the critical habitat overall for the conservation/recovery of the listed species; (2) the *Environmental Baseline*, which analyzes the current condition of the critical habitat in the action area without the consequences to designated critical habitat caused by the proposed action, the factors responsible for that condition, and the value of the critical habitat in the action area for the conservation/recovery of the listed species; (3) the *Effects of the Action*, which determines all consequences to designated critical habitat that are caused by the proposed federal action on the key components of critical habitat that provide for the conservation of the listed species, and how those impacts are likely to influence the conservation value of the affected critical habitat; and (4) *Cumulative Effects*, which evaluate the effects of future non-federal activities that are reasonably certain to occur in the action area on the key components of critical habitat that provide for the conservation of the listed species and how those impacts are likely to influence the conservation value of the affected critical habitat. The *Effects of the Action* and *Cumulative Effects* are added to the *Environmental Baseline* and in light of the status of critical habitat, the Service formulates its opinion as to whether the action is likely to destroy or adversely modify designated critical habitat. The Service's opinion evaluates whether the action is likely to impair or preclude the capacity of critical habitat in the action area to serve its intended conservation function to an extent that appreciably diminishes the rangewide value of critical habitat for the conservation of the listed species. The key to making that finding is understanding the value (i.e., the role) of the critical habitat in the action area for the conservation/recovery of the listed species based on the *Environmental Baseline* analysis.

Status of the Species and Environmental Baseline

For this Programmatic Opinion the Status of the Species will serve as the environmental baseline due to the large area the Program will function in. The appendages to this Programmatic Opinion will detail Project level environmental baselines.

California Red-Legged Frog

Legal Status

The California red-legged frog was listed as a threatened species on May 23, 1996 (Service 1996). Critical habitat was designated for this species on April 13, 2006 (Service 2006), with revisions to the critical habitat designation published on March 17, 2010 (Service 2010). At that time, the Service recognized the taxonomic change from *Rana aurora draytonii* to *Rana draytonii* (Shaffer et al. 2010). A recovery plan was published for the California red-legged frog on September 12, 2002 (Service 2002).

Description

The California red-legged frog is the largest native frog in the western United States (Wright and Wright 1949), ranging from 1.5 to 5.1 inches in length (Stebbins 2003). The abdomen and hind legs of adults are largely red, while the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background color. Dorsal spots usually have light centers (Stebbins 2003); dorsolateral folds are prominent on the back. The California red-legged frog is sexually dimorphic; the females are larger than the males (Dodd 2013a, b). California red-legged frog tadpoles range from 0.6 inch to 3.1 inches in length and the background color of the body is dark brown and yellow with darker spots (Storer 1925).

Current Status and Distribution

The historical range of the California red-legged frog extended from central Mendocino County and western Tehama County south in the California Coast Range to northern Baja California, Mexico, and in the Sierra Nevada/Cascade Ranges from Shasta County south to Madera County (Jennings and Hayes 1994). The species historically occurred from sea level to elevations of about 5,200 feet in 46 counties; however, currently the taxon is extant in 238 streams or drainages within only 22 counties, representing a loss of 70 percent of its former range (Service 2002). Isolated populations persist in several Sierra Nevada foothill locales and in Riverside County (Barry and Fellers 2013; Backlin et al. 2017; CDFW 2019; Gordon, R. and J. Bennett, pers. comm., 2017). The species is no longer considered extant in California's Central Valley due to significant declines caused by habitat modifications and exotic species (Fisher and Shaffer 1996). Currently, the California red-legged frog is widespread in the San Francisco Bay nine-county area (CNDDB 2022). They are still locally abundant within the California coastal counties from Mendocino County to Los Angeles County and presumed extirpated in Orange and San Diego counties (CDFW 2019; Yang, D. and J. Martin, pers. comm., 2017; Gordon, R. and J. Bennett, pers. comm., 2017). Baja California represents the southernmost edge of the species' current range (Peralta-García et al. 2016).

Barry and Fellers (2013) conducted a comprehensive study to determine the current range of the California red-legged frog in the Sierra Nevada, concluding that it differs little from its historical range; however, the current Sierra Nevada populations appear to be small and tend to fluctuate. Since 1991, eleven California red-legged frog populations have been discovered or confirmed, including eight probable breeding populations (Barry and Fellers 2013; Mabe, J., pers. comm., 2017). Microsatellite and mitochondrial DNA analysis by Richmond et al. (2014) confirmed the Sierra Nevada populations of the California red-legged frog are genetically distinct from each other, as well as from other populations throughout the range of this species. The research concluded that the Sierra Nevada populations are persisting at low levels of genetic diversity and no contemporary gene flow across populations exist. On a larger geographic scale, range contraction has left a substantial gap between Sierra Nevada and Coast Range populations, similar to the gap separating the Southern California and Baja California populations (Richmond et al. 2014).

Habitat

The California red-legged frog generally breeds in still or slow-moving water associated with emergent vegetation, such as cattails, tules (hardstem bulrush), or overhanging willows (Storer 1925; Fellers 2005). Aquatic breeding habitat predominantly includes permanent water sources such as streams, marshes, and natural and manmade ponds in valley bottoms and foothills (Jennings and Hayes 1994; Bulger et al. 2003; Stebbins 2003). Since the 1850's, manmade ponds may actually supplement stream pool breeding habit and can be capable of supporting large populations of this species. Breeding sites may hold water only seasonally, but sufficient water must persist at the beginning of the breeding season and into late summer or early fall for tadpoles to successfully complete metamorphosis. Breeding habitat does not include deep lacustrine water habitat (e.g., deep lakes and reservoirs 50 acres or larger in size) (Service 2010). Within the coastal lagoon habitats, salinity is a significant factor on embryonic mortality or abnormalities (Jennings and Hayes 1990). Jennings and Hayes (1990) conducted laboratory studies and field observations concluding salinity levels above 4.5 parts per thousand detrimentally affected the California red-legged frog embryos. Aquatic breeding habitat does not need to be available every year, but it must be available at least once within the frog's lifespan for breeding to occur (Service 2010).

Non-breeding aquatic habitat consists of shallow (non-lacustrine) freshwater features not suitable as breeding habitat, such as seasonal streams, small seeps, springs, and ponds that dry too quickly to support breeding. Non-breeding aquatic and riparian habitat is essential for providing the space, food, and cover necessary to sustain the California red-legged frog. Riparian habitat consists of vegetation growing nearby, but not typically in, a body of water on which it depends, and usually extends from the bank of a pond or stream to the margins of the associated floodplain (Service 2010). Adult California red-legged frogs may avoid coastal habitat with salinity levels greater than 6.5 parts per thousand (Jennings and Hayes 1990).

Cover and refugia are important habitat characteristic preferences for the species (Halstead and Kleeman 2017). Refugia may include vegetation, organic debris, animal burrows, boulders, rocks, logjams, industrial debris, or any other object that provides cover. Agricultural features such as watering troughs, spring boxes, abandoned sheds, or haystacks may also be utilized by the species. Incised stream channels with portions narrower and depths greater than 18 inches may also provide important summer sheltering habitat. During periods of high water flow, California red-legged frogs are rarely observed; individuals may seek refuge from high flows in pockets or small mammal burrows beneath banks stabilized by shrubby riparian growth (Jennings and Hayes 1994). Accessibility to cover habitat is essential for the survival of California red-legged frogs within a watershed and can be a factor limiting frog population numbers and survival.

Breeding

The California red-legged frog typically breeds between November and April; however, breeding may occur later in the Sierra Nevada Range (Barry 2002). Females deposit their egg masses on emergent vegetation, floating on or near the surface of the water. The California red-legged frog is often a prolific breeder, laying eggs during or shortly after large rainfall events in late winter and early spring. Egg masses containing 300-4,000 eggs hatch after six to fourteen days (Storer 1925; Jennings and Hayes 1994; Fellers 2005). Historically, the California red-legged frog in the Sierra Nevada likely bred within stream pools, which tend to be small with limited forage, constraining the size and number of populations (Barry and Fellers 2013).

California red-legged frog tadpoles undergo metamorphosis three to seven months following hatching. Most males reach sexual maturity in two years, while it takes approximately three years for females (Jennings and Hayes 1985; Fellers 2005). Under favorable conditions, California red-legged frogs may live eight to ten years (Jennings et al. 1992). Of the various life stages, tadpoles likely experience the highest mortality rates; only one percent of each egg mass completes metamorphosis (Jennings et al. 1992).

Diet

The California red-legged frog has a variable diet that changes with each of its life history stages. The feeding habits of the early stages are likely similar to other ranids, whose tadpoles feed on algae, diatoms, and detritus by grazing on the surface of rocks and vegetation (Fellers 2005). Hayes and Tennant (1985) found invertebrates to be the most common food items of adult California red-legged frogs collected in southern California; however, they speculated that this was opportunistic and varied based on prey availability. Vertebrates, such as Pacific tree frogs and California mice, represented over half of the prey mass eaten by larger frogs, although invertebrates were the most numerous food items. Bishop et al. (2014) found that diet changed throughout the seasons based on prey available but that terrestrial invertebrate prey made up the majority of adult California red-legged frog diet regardless of season. Data was based on stable isotope analysis and stomach sampling of live frogs in Pacifica, California, and museum specimens from the San Francisco Bay Area. Juveniles appear to forage during both daytime and nighttime, whereas adults appear to feed at night (Hayes and Tennant 1985).

Movement

California red-legged frogs do not have a distinct breeding migration (Fellers 2005), rather they may move seasonally from non-breeding pools or refugia to breeding pools. Some individuals remain at breeding sites year-round while others disperse to neighboring water features or moist upland sites when breeding is complete and/or when breeding pools dry (Service 2002; Bulger et al. 2003; Fellers and Kleeman 2007; Tatarian and Tatarian 2008; Tatarian 2008). Studies in the several San Francisco Bay counties showed movements are typically along riparian corridors (Fellers and Kleeman 2007; Tatarian 2008). Although, some individuals, especially on rainy nights and in more mesic areas, travel without apparent regard to topography, vegetation type, or riparian corridors, and can move directly from one site to another through normally inhospitable habitats such as heavily grazed pastures or oak-grassland savannas (Bulger et al 2003).

California red-legged frogs show high site fidelity (Tatarian and Tatarian 2008) and typically do not move significant distances from breeding sites (Bulger et al. 2003; Fellers and Kleeman 2007; Tatarian and Tatarian 2008; Tatarian 2008). When traveling between aquatic sites, California red-legged frogs typically travel less than 0.31 mile (Fellers and Kleeman 2007; Tatarian and Tatarian 2008), although they have been documented to move more than two miles in Santa Cruz County (Bulger et al. 2003). Various studies have found that the frogs typically do not make terrestrial forays further than 200 feet from aquatic habitat (Bulger et al. 2003; Fellers and Kleeman 2007; Tatarian and Tatarian 2008; Tatarian 2008). Upland movements are typically associated with precipitation events and usually last for one to four days (Tatarian 2008).

Threats

Factors associated with declining populations of the California red-legged frog throughout its range include degradation and loss of habitat through agriculture, urbanization, mining, overgrazing, recreation, timber harvesting, non-native species, impoundments, water diversions, erosion and siltation altering upland and aquatic habitat, degraded water quality, use of pesticides, and introduced predators (Service 2002, 2010). Urbanization often leaves isolated habitat fragments and creates barriers to frog dispersal.

Non-native species pose a major threat to the recovery of California red-legged frogs. Several researchers have noted the decline and eventual local disappearance of California and northern red-legged frogs in systems supporting bullfrogs (Jennings and Hayes 1990; Twedt 1993), red swamp crayfish, signal crayfish, and several species of warm water fish including sunfish, goldfish, common carp, and mosquitofish (Moyle 1976; Barry 1992; Hunt 1993; Fisher and Shaffer 1996). The decline of the California red-legged frog due to these non-native species has been attributed to predation, competition, and reproduction interference (Twedt 1993; Bury and Whelan 1984; Storer 1933; Emlen 1977; Kruse and Francis 1977; Jennings and Hayes 1990; Jennings 1993).

Chytridiomycosis, an infectious disease caused by the chytrid fungus, *Batrachochytrium dendrobatidis* (*Bd*), has been found to adversely affect amphibians globally (Davidson et al. 2003; Lips et al. 2006). While *Bd* prevalence in wild amphibian populations in California is unknown (Fellers et al. 2011), chytrid is expected to be widespread throughout much of the California red-legged frog's range. The chytrid fungus has been documented within the California red-legged frog populations at Point Reyes National Seashore, two properties in Santa Clara County, Yosemite National Park, Hughes Pond, Sailor Flat, Big Gun Diggings, and Spivey Pond (Padgett-Flohr and Hopkins 2010; Tatarian and Tatarian 2010; Fellers et al. 2011; Barry and Fellers 2013). However, no chytrid-related mortality has been reported in these populations, suggesting that California red-legged frogs are less vulnerable to the pathogenic effects of chytrid infection than other amphibian species (Tatarian and Tatarian 2010; Barry and Fellers 2013; Fellers et al. 2017). While chytrid infection may not directly lead to mortality in California red-legged frogs, Padgett-Flohr (2008) states that this infection may reduce overall fitness and could lead to long-term effects. Therefore, it is difficult to estimate the full extent and risk of chytridiomycosis to the California red-legged frog populations.

Negative effects to wildlife populations from roads and pavement may extend some distance from the actual road. The phenomenon can result from any of the effects already described in this Biological Opinion, such as vehicle-related mortality, habitat degradation, and invasive exotic species. Forman and Deblinger (1998, 2000) described the area affected as the "road effect" zone. Along a four-lane road in Massachusetts, they determined that this zone extend for an average of approximately 980 feet to either side of the road for an average total zone width of approximately 1,970 feet. They describe the boundaries of this zone as asymmetric and in some areas diminished wildlife use attributed to road effects was detected greater than 0.6 mile from Massachusetts Route 2. The "road-zone" effect can also be subtle. Van der Zande *et al.* (1980) reported that lapwings and black-tailed godwits feeding at 1,575-6,560 feet from roads were disturbed by passing vehicles. The heart rate, metabolic rate and energy expenditure of female bighorn sheep increase near roads (MacArthur *et al.* 1979). Trombulak and Frissell (2000) described another type of "road-zone' effect due to contaminants. Heavy metal concentrations from vehicle exhaust were greatest within 66 feet of roads, but elevated levels of metals in both soil and plants were detected at 660 feet of roads. The "road-zone" apparently varies with habitat type and traffic volume. Based on responses by birds, Forman and Deblinger (2000) estimated the effect zone along primary roads of 1,000 feet in woodlands, 1,197 feet in grasslands, and 2,657 feet in natural lands near urban areas. Along secondary roads with lower traffic volumes, the effect zone was 656 feet. The "road-zone" effect with regard to California red-legged frogs has not been adequately investigated.

The necessity of moving between multiple habitats and breeding ponds means that many amphibian species, such as the California red-legged frog, are especially vulnerable to roads and well-used large paved areas in the landscape. Van Gelder (1973) and Cooke (1995) have examined the effect of roads on amphibians and found that because of their activity patterns, population structure, and preferred habitats, aquatic breeding amphibians are more vulnerable to traffic mortality than some other species. Large, high-volume highways pose a nearly impenetrable barrier to amphibians and result in mortality to individual animals as well as significantly fragmenting habitat. Hels and Buchwald (2001) found that mortality rates for anurans on high traffic roads are higher than on low traffic roads. Vos and Chardon (1998) found a significant negative effect of road density on the occupation probability of ponds by the moor frog in the Netherlands. In addition, incidents of very large numbers of road-killed frogs are well documented (*e.g*., Ashley and Robinson 1996), and studies have shown strong population level effects of traffic density (Carr and Fahrig 2001) and high traffic roads on these amphibians (Van

Gelder 1973; Vos and Chardon 1998). Most studies regularly count road kills from slow moving vehicles (Hansen 1982; Rosen and Lowe 1994; Drews 1995; Mallick *et al.* 1998) or by foot (Munguira and Thomas 1992). These studies assume that every victim is observed, which may be true for large conspicuous mammals, but it certainly is not true for small animals, such as the California red-legged frog. Amphibians appear especially vulnerable to traffic mortality because they readily attempt to cross roads, are slow-moving and small, and thus cannot easily be avoided by drivers (Carr and Fahrig 2001).

Recovery Plan

The Recovery Plan for the California red-legged frog identifies eight recovery units (Service 2002). Based on various regional areas of the species' range, the establishment of these recovery units is essential to its survival and recovery. The goal of the recovery plan is to protect the long-term viability of all extant populations within each recovery unit. Within each recovery unit, delineated core areas, designed to protect metapopulations, represent contiguous areas of moderate to high California red-legged frog densities. The management strategy identified within this Recovery Plan will allow for the recolonization of habitats within and adjacent to core areas naturally subjected to periodic localized extinctions, thus assuring the long-term survival and recovery of California red-legged frogs.

<u>California Freshwater Shrimp</u>

For the most recent comprehensive assessment of the species' rangewide status, please refer to the *California Freshwater Shrimp (Syncaris pacifica) 5-year Review: Summary and Evaluation* (Service 2011). No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2011 5-year review was finalized, with loss of habitat being the most significant effect. To date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species. The Service is in the process of finalizing its most current 5-year review for the species.

<u>San Francisco Garter Snake</u>

Please refer to the *Species Status Assessment for the San Francisco Garter Snake* (Thamnophis sirtalis tetrataenia*)* (Service 2020) for the most recent comprehensive assessment of the species' range-wide status. A recent *5-Year Review for the San Francisco Garter Snake* (*Thamnophis sirtalis tetrataenia*) (Service 2020d) reaffirmed the species' endangered status. Current threats include fragmentation and urbanization, changes to aquatic habitat, seral succession, illegal collection, predation from non-native species, and small population sizes (Service 2020d). To date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species.

<u>Tidewater Goby</u>

Legal Status

A range-wide decline of 35 percent over 6 years (1984-1990) due to modification and loss of habitat from coastal development, channelization of habitat, diversions of water flows, groundwater over drafting, and alteration of water flows prompted the Service to list the goby as endangered on March 7, 1994 (59 FR 5494) and designate critical habitat on February 6, 2013 (78 FR 8745). The Service published a recovery plan for the goby on December 12, 2005

(Service 2005) and a 5 year [status] review in September 2007 (Service 2007). The Service published a proposed rule to downlist the goby on March 13, 2014 (79 FR 14339). During the public comment period, the Service received substantial comments regarding the proposed change in species status, and new scientific information that had been published on the species. The goby remains listed as endangered and its overall population and range is currently stable, but still faces ongoing and likely increasing threats of urbanization, artificial breaching, stochastic environmental events, and introduced predators.

Taxonomy and Description

Detailed accounts of the taxonomy, ecology, and reproductive characteristics of the goby are found in the following publications: final rule listing the species (59 FR 5494), the proposed rule to delist northern goby populations (64 FR 33816), the final rule withdrawing the Service's proposal to delist the northern goby populations (67 FR 67803), the 12-month finding and proposed rule to reclassify the goby as threatened (79 FR 14340), the recovery plan (Service 2005), and the final critical habitat rule (78 FR 8745).

The goby is a small elongate fish rarely exceeding 2 inches in total length. This species possesses large pectoral fins, and the pelvic, or ventral fins are joined to each other below the chest and belly from below the gill cover back to just anterior of the anus. Male gobies are nearly transparent with a mottled brownish upper surface. Females develop darker colors, often black, on the body and dorsal and anal fins.

Swift et al. (2016) estimates that the southernmost population of goby has been separated from other lineages for 2 to 4 million years, and concluded that the southernmost population is a distinct species, *Eucyclogobius kristinae*, the southern tidewater goby. However, as of April 2022 both the northern and southern populations of gobies remain listed under the Act as one entity. The southernmost population of goby remains critically endangered because this species has become extirpated from five of the 13 historical localities, four of which cannot be restored.

Habitat Use

The goby is endemic to California and is one of the only species of fish to live exclusively in brackish water coastal lagoons, estuaries, and marshes in California (Swift et al., 1989). Tidewater goby habitat is characterized by still, but not stagnant, brackish water (flow < 0.5 ft/second). They can withstand a wide range of habitat conditions and have been documented in waters with salinity levels that range from 0 to 42 parts per thousand (ppt), temperatures ranging from 46 to 77 degrees Fahrenheit and water depths from 10 to 79 inches (Chamberlain 2006; Irwin and Soltz 1984; Swift et al. 1989). Most goby collections occurred in water of approximately one-third ocean salinity; (i.e., 12 ppt or less; Service 2005). Tidewater gobies are generally found over substrate that has a high percentage of sand and gravel (Worcester 1992) and are often clumped in areas that have sparse to medium dense cover by aquatic plants or algae (Worcester 1992).

Tidewater gobies often migrate upstream and are commonly found up to 0.6 mile from a lagoon or estuary (Service 2005), in areas with muted or intermittent connectivity to tidal waters (Chamberlain 2006), but have been recorded as far as 1.6 to 7.3 miles upstream of tidal areas (Chamberlain 2006; Irwin and Soltz 1984; Swift et al. 1997). Although the reasons for the variation in up-stream movement between one locality and another have not been determined, stream gradient and velocity are likely to be important factors. They generally avoid swift moving waters and are considered weak swimmers, spending all life stages in brackish waters and only entering marine environments on rare occasions when flushed out by flooding or breaching of sandbars (Lafferty et al. 1999b; Swift et al. 1989).

Tidewater gobies enter the marine environment when sandbars are breached during storm events. Lafferty et al. (1999b) demonstrated that gobies were able to disperse at least 5.6 miles, and genetic analysis suggests that this species can disperse much farther, with genetic assignment tests showing movement of individuals up to approximately 30 miles (Jacobs et al. 2005). The species' tolerance of high salinities for short periods of time enables it to withstand marine environment conditions of approximately 35 ppt salinity, thereby allowing the species to re-establish or colonize lagoons and estuaries following flood events (Swift et al. 1997). Genetic studies indicate that the goby population is highly geographically structured, suggesting that there is low gene flow (Dawson et al. 2001, 2002) and thus natural recolonization events are likely rare.

Food Habits

Tidewater gobies feed opportunistically on small benthic invertebrates, including amphipods, ostracods, snails, mysids, and aquatic insect larvae, particularly chironomid larvae (Swift et al. 1989). Predators of gobies include staghorn sculpin (*Leptocottus armatus*), prickly sculpin (*Cottus asper*), starry flounder (*Platichthys stellatus*), and largemouth bass (*Micropterus salmoides*); native birds and other predatory fish likely prey on gobies (Swift et al. 1989, 1997). Tidewater gobies use three different foraging styles to capture prey: plucking prey from substrate surface, sifting sediment in their mouth, and mid-water capture (Service 2005).

Demographics and Reproduction

The goby is primarily an annual species (Hellmair and Kinziger 2014; Swift et al. 1989), although there is some variation in life history and some individuals have lived up to 3 years in captivity (Swenson 1999). If reproductive output during a single year fails, few (if any) gobies survive into the next year. Reproduction can occur at all times of the year; however, it typically peaks from late April or May to July and can continue into November or December depending on the seasonal temperature and amount of rainfall (Goldberg 1977; Swift et al. 1989; Worcester 1992). Males begin the breeding ritual by digging burrows at least 3 to 4 inches apart in clean, coarse sand of open areas. Unlike most other fish, females court the males (Swift et al., 1989). Once chosen by a male, females will then deposit eggs into the burrows, averaging 400 eggs per spawning effort (Swenson 1995; Swift et al. 1989). Tidewater gobies can breed more than once in a season, with a lifetime reproductive potential of 3 to 12 spawning events (Swenson 1999). Males remain in the burrows to guard the eggs and fan the eggs to circulate water, frequently foregoing feeding (Moyle 2002).

Within 9 to 11 days after eggs are laid, larvae emerge and are approximately 0.16 to 0.24 inch in standard length (Service 2005; Swift et al. 1989). Larval traits (larval duration, size at settlement, and growth rate) are correlated with water temperature, which varies considerably in the seasonally closed estuaries that gobies inhabit (Spies and Steele 2016). Larval gobies are pelagic for an average of 21 to 27 days and settle once they grow to approximately 0.47 to 0.51 inch in standard length (Spies et al. 2014). When they reach this life stage, they become substrate-oriented, spending most of the time on the bottom rather than in the water column. Vegetation is critical for over-wintering gobies because it provides refuge from high water flows and goby densities are greatest among emergent and submerged vegetation (Moyle 2002).

Because they typically live for approximately 1 year and inhabit a seasonally changing environment, population sizes of gobies vary greatly spatially and seasonally, with density estimates ranging from 0 to 198 individuals per 11 square feet within a single population (Swenson 1999). However, when present, gobies are frequently the most abundant fish species found at a site (Lafferty et al. 1999a). After the spring spawning season, there is typically an annual die-off of adults (Swenson 1995; Swift et al. 1989).

Species Distribution and Abundance

Historically, the goby occurred in at least 150 California coastal lagoons and estuaries, from Tillas Slough near the Oregon/California border in Del Norte County south to Agua Hedionda Lagoon in northern San Diego County (Swift et al. 1989). The southern extent of its distribution has been reduced by several miles after the mouth of Agua Hedionda Lagoon was permanently modified to be open to the ocean and no longer supports gobies. Between 2015 and 2019, gobies were found at 103 localities within the original range, although the number of sites fluctuates with climatic conditions and the current status is unknown in 12 localities (Service 2020; unpublished data).

The number of gobies within a locality is extremely variable, geographically and temporally (Swift et al. 2018; Holland et al. 2001; Swenson 1995; Swift et al. 1989). While there is, in general, a seasonality to increases and declines, not all localities synchronously follow the same pattern because of locality-specific differences in lagoonal processes and the number and type of predator and competitor species. When habitat conditions are favorable, repeat spawning can allow gobies to undergo a 10x to 100x population increase over several months. Similarly, a change in habitat conditions or the arrival of predators in a lagoon can substantially reduce even sizable goby populations, over weeks or potentially in as short as a few hours (such as when a highly perched lagoon rapidly de-waters after a sandbar breach). Thus, information on abundance of gobies at a given locality is important for assessing (1) the status of gobies at that locality at a given time, and (2) that locality's potential contribution to metapopulation dynamics (see below); however, information on abundance at a given locality is not, by itself, informative to the overall species-level or even metapopulation-level trend. Additionally, trend data is limited for most localities; only a few localities have ongoing abundance monitoring.

Currently, the most stable populations are in lagoons and estuaries of intermediate size (5 to 124 acres) that are relatively unaffected by human activities (Service 2005). Natural gaps in the species' distribution occur where the coastline is steep, and streams do not form lagoons or estuaries. Some of the largest gaps in distribution occur in Humboldt and Mendocino counties, as well as in northern Sonoma County. From Tamales Bay southward to San Francisco, habitat loss and other anthropogenic-related factors have resulted in the creation of unnatural gaps in the species' distribution where the species is absent from several locations where it historically occurred (Capellil 1997). Several large natural and unnatural gaps occur between San Francisco Bay and San Diego County as well.

Across the northern portion of its range (i.e., the North Coast Recovery unit), populations of gobies are considered fully isolated from one another, because dispersal is extremely rare and post-extirpation recolonizations are almost nonexistent (Kinziger et al. 2015). Local populations of gobies in the remaining southern portion of the range are best characterized as metapopulations (Lafferty et al. 1999a), which are "a network of semi-isolated populations with some level of regular or intermittent migration and gene flow among them, in which individual populations may go extinct but can then be recolonized from other populations" (Groom et al.

2006). Therefore, the stability of a metapopulation depends on the connectivity of subpopulations.

North Coast Recovery Unit

The North Coast Recovery Unit extends from Smith River in Del Norte County, California near the Oregon border to the southern end of Mendocino County, California and has the greatest geographic extent along the coast (approximately 150 miles) of any of the recovery units. The North Coast Recovery Unit forms a discrete clade in phylogenetic analyses (Dawson et al. 2001) and is also differentiated from other units in that all fish observed have complete supraorbital canal structures (Ahnelt et al. 2004).

Kinziger et al. (2015) analyzed temporal genetic variation across 14 goby populations within the North Coast Recovery Unit and failed to recover genetic change expected with extinction–colonization cycles. Similarly, analysis of site occupancy data from field studies (94 sites) indicated that extinction and colonization were very infrequent. They found strong genetic differentiation between populations and a high degree of within-site temporal stability as consistent with a model of drift in the absence of migration, at least over the past 20–30 years, indicating that the gobies within the North Coast Recovery Unit probably exhibit two different population-structuring mechanisms across their geographic distribution. Tidewater gobies exhibit a more classic extinction–colonization dynamic in the southern portion of the Unit as compared to a drift in isolation (in the absence of migration) in the northern portion. These data indicate that for goby populations in the North Coast Recovery Unit, natural dispersal is too infrequent to be considered a viable approach for recolonizing extirpated populations, suggesting that conservation/artificial translocation in this portion of their range may be necessary to effectuate recolonization.

The North Coast Recovery Unit is comprised of 6 sub-units in the recovery plan (Service 2005). In the North Coast sub-units: NC1, 2 of 2 localities are extant (100%); NC2, 3 of 5 localities are extant (60%); NC3, 12 of 20 localities are extant (60%); NC4, 1 of 1 locality is extant (100%); NC5, 2 or 2 localities are extant (100%); and NC6, 1 of 1 locality is extant (100%). In the North Coast Recovery Unit, 9 localities of 31 localities (29%) have been extirpated within the last 5 years (Sutter and Kinziger, 2019).

Greater Bay Area Recovery Unit

The Greater Bay Area Recovery Unit extends from Salmon Creek just north of Bodega Head in Sonoma County to the Salinas River Valley in Monterey County. It is separated from the North Coast Recovery Unit by 60 miles of steep coast and a clade break is evident in some analyses (Dawson et al., 2001). To the south, this unit is separated from the Central Coast Recovery Unit by the steep 100-mile long Big Sur Coast which lacks lagoon habitat appropriate for tidewater gobies. Again, a clade break between the Greater Bay Area Recovery Unit and Central Coast Recovery Unit is evident in the Dawson et al. (2001) analysis. The Greater Bay Area Recovery Unit has a low frequency of modest reduction of the supraorbital canal, as opposed to the North Coast Recovery Unit where no such reduction is observed, and differs from the units to the south where such reduction is more pervasive and instances of reduction are more substantial (Ahnelt et al., 2004). The Greater Bay Area Recovery Unit has high local genetic differentiation (Service 2005, Appendix G).

Within the Greater Bay Area Recovery Unit there are 11 sub-units comprised of 41 localities in the 2005 recovery plan. Spies et al. (in prep.) describe 41 localities in 10 sub-units (GB11 was combined with GB10). In the single locality that comprises sub-unit GB1, it appears to be persistently occupied by the northern tidewater goby. In the 4 localities that comprise sub-unit GB2, the tidewater goby appears to persistently occupy 2 localities and 2 localities have been extirpated. In the 2 localities that comprise sub-unit GB3, the northern tidewater goby appears to have been extirpated from both. In the 7 localities that comprise sub-unit GB4, the northern tidewater goby appears to persistently occupy 1 locality and 6 localities have been extirpated. In the 7 localities that comprise sub-unit GB5, the northern tidewater goby appears to persistently occupy 4 localities (of which 1 has records of past absence and 1 was recently discovered for the first time) and intermittently occupy 3 localities (of which 1 has records of past absence and 2 were recently discovered for the first time). In the 3 localities that comprise sub-unit GB6, the northern tidewater goby appears to persistently occupy 2 localities and intermittently occupy 1 locality (all 3 localities have records of past absence). In the 6 localities that comprise sub-unit GB7, the tidewater goby appears to persistently occupy all 6 localities (of which 1 has records of past absence). In the 4 localities that comprise sub-unit GB8, the tidewater goby appears to persistently occupy 2 localities and intermittently occupy 2 localities. In the 2 localities that comprise sub-unit GB9, the tidewater goby appears to persistently occupy both localities (which both have records of past absence). In the 5 localities that comprise sub-unit GB10, the tidewater goby appears to intermittently occupy all 5 localities (Service 2020; unpublished data).

Central Coast Recovery Unit

The Central Coast Recovery Unit is bounded on the north by the steep Big Sur Coast and on the south by Point Buchon immediately south of Morro Bay and is differentiated by a clade break identified in Dawson et al. (2001). On the basis of headlands at Point Piedras Blancas and north of Estero Point the region is subdivided into three low coastal regions considered to be the sub-units (Service 2005, Appendix G). In most cases these sub-units support many small closely spaced coastal lagoons.

Within the Central Coast Recovery Unit there are 3 sub-units comprised of 20 localities in the 2005 recovery plan. Spies et al. (in prep.) describe 20 localities in 2 sub-units. The Central Coast Recovery Unit was re-evaluated by Spies et al. (in prep), and is now comprised of 2 sub-units, CC1–CC2, instead of the 3 sub-units that were identified in the recovery plan (CC1 and CC2 were reassigned and CC3 was combined with CC2). In the 11 localities that comprise sub-unit CC1, the tidewater goby appears to persistently occupy 9 localities (of which 3 have records of past absence) and 2 localities have been extirpated. In the 9 localities that comprise sub-unit CC2, the northern tidewater goby appears to persistently occupy 4 localities (of which 3 have records of past absence) intermittently occupy 4 localities (of which 2 have intermittent habitat and 2 have records of past absence) and 1 locality has been extirpated (Service 2020; unpublished data).

Threats

Tidewater goby population declines are attributed mainly to environmental conditions; primarily from habitat loss or degradation resulting from urban, agricultural, and industrial development in and around coastal wetlands, lagoons, and estuaries (Irwin and Soltz 1984). High flows naturally and periodically breach lagoon barriers and expose gobies to tidal conditions, but artificial breaching has been observed to cause goby stranding and mortality (Swift et al. 2018). Artificial breaching, especially during periods of low inflow, not only flushes gobies out into the ocean but also drains water from the lagoon and thus reduces the size of available habitat for this species; this can also concentrate predators within this reduced lagoon footprint (Kraus et al., 2002).

Some extirpations appear to be related to pollution, upstream water diversions, and the introduction of non-native predatory fish species, most notably Centrarchids such as sunfish (*Lepomis* sp.) and bass (*Micropterus* sp; Swift et al. 1989); and competition with introduced fish species (e.g., yellowfin goby (*Acanthogobius flavimanus*) and chameleon goby (*Tridentiger trigonocephalus*)) (Service 2005). These threats continue to affect some of the remaining populations of gobies. Climate change and the attendant sea level rise may further reduce suitable habitat for the goby as lagoons and estuaries are inundated with saltwater (Cayan et al. 2008) and severe storms interacting with increased sea levels may breach lagoons more frequently.

Status of Critical Habitat

California Red-Legged Frog Critical Habitat

On March 17, 2010, the Service designated critical habitat for the California red-legged frog (Service 2010). In total, 1,636,609 million acres were designated as critical habitat for the California red-legged frog in 27 California counties. The current designation better reflects the lands containing those essential habitat features necessary for the conservation of the California red-legged frog than did earlier designations that had been subject to litigation. A detailed discussion of the methods used in developing proposed critical habitat can be found in the final rule (Service 2010).

We have identified the physical or biological features, or PCEs, essential to the conservation of the species that may require special management considerations or protection. Because not all life-history functions require all the PCEs, not all areas designated as critical habitat will contain all the PCEs. Based on our current knowledge of the life-history, biology, and ecology of the California red-legged frog, we determined the California red-legged frog's PCEs to consist of: 1) aquatic breeding habitat; 2) aquatic non-breeding habitat; 3) upland habitat, and 4) dispersal habitat. Detailed descriptions of these PCEs can be found in the final rule (Service 2010). The following is a brief summary of the PCEs:

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

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

3. Upland habitat consists of upland areas adjacent to or surrounding breeding and nonbreeding aquatic and riparian habitat up to a distance of one mile in most cases (i.e., depending on surrounding landscape and dispersal barriers) including various vegetation types such as grassland, woodland, forest, wetland, or riparian areas that provide shelter, forage, and predator avoidance for the California red-legged frog. Upland habitat should include structural features such as boulders, rocks and organic debris (e.g., downed trees, logs), small mammal burrows, or moist leaf litter.

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

Tidewater Goby Critical Habitat

The Service originally designated critical habitat for the goby on November 20, 2000 (65 FR 69693). In January 2008, the Service finalized a revised designation of critical habitat (73 FR 5920). On October 19, 2011, the Service published another proposed revision to critical habitat (76 FR 64996), and on February 6, 2013, the Service published a final rule designating revised critical habitat for the goby (78 FR 8745).

Under the Act and its implementing regulations, the Service is required to identify the physical and biological features (PBFs) essential to the conservation of the goby in areas occupied at the time of listing. The Service considers the PBFs that, when present in the appropriate quantity and spatial arrangement to provide for a species' life-history processes, are essential to the conservation of the species.

A final rule published on February 11, 2016 (81 FR 7414), removed the phrase "primary constituent elements" (PCEs) from the regulations for designating critical habitat (50 CFR 424.12). Instead, new designations will focus on "physical and biological features" (PBFs). Existing critical habitat rules may still define PCEs; however, the two terms (PBFs and PCEs) may be used interchangeably as they are considered synonymous. In cases where an existing critical habitat rule numbers PCEs specifically (e.g., PCE-1, PCE #1), we will use the terms as defined in the existing critical habitat designation to avoid confusion.

The PCEs specific to the goby include:

PCE 1: Persistent, shallow (in the range of approximately 0.3 to 6.6 feet), still-to-slow-moving water in lagoons, estuaries, and coastal streams with salinity up to 12 ppt, which provides adequate space for normal behavior and individual and population growth that contain one or more of the following:

- PCE 1a: Substrates (e.g., sand, silt, mud) suitable for the construction of burrows for reproduction;

- PCE 1b: Submerged and emergent aquatic vegetation, such as *Potamogeton pectinatus*, *Ruppia maritima*, *Typha latifola*, and *Scirpus* spp., that provides protection from predators and high flow events; or

- PCE 1c: Presence of a sandbar(s) across the mouth of a lagoon or estuary during the late spring, summer, and fall that closes or partially closes the lagoon or estuary, thereby providing relatively stable water levels and salinity.

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

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

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

Effects of the Action

General Effects

In accordance with 50 CFR 402.02, effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of all other activities that are caused by the proposed action. 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. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see §402.17).

Direct effects to adult and juvenile shrimp, adult and juvenile gobies, and to red-legged frog adults, sub-adults, tadpoles, and eggs in the footprint of projects utilizing the proposed authorization would include injury or mortality from being crushed by earth-moving equipment, construction debris, and worker foot traffic. These effects would be reduced by minimizing and clearly demarcating the boundaries of the project areas.

Shrimp, gobies, and red-legged frog tadpoles may be entrained by pump or water diversion intakes. Screening pump intakes with wire mesh not greater than 1/8-inch diameter may reduce the potential that shrimp, gobies and tadpoles would be caught in the inflow.

Shrimp, gobies, and red-legged frogs may be killed by predators. If water that is impounded during or after work activities creates favorable habitat for non-native predators, such as bullfrogs, crayfish, and centrarchid fishes, then shrimp, gobies, and red-legged frogs may incur abnormally high rates of predation. Additionally, any time red-legged frogs, or gobies are concentrated in a small area at unusually high densities, native predators may feed on them opportunistically. This impact can be minimized by avoiding creation of ponded water as a result of project actions such as dewatering the work area.

Trash left during or after project activities could attract predators to work sites, which could, in turn, prey on shrimp and red-legged frogs. For example, raccoons are attracted to trash and also prey opportunistically on both species. This potential impact can be reduced or avoided by careful control of waste products at all work sites.

Accidental spills of hazardous materials or careless fueling or oiling of vehicles or equipment could degrade water quality to a degree where shrimp, gobies, or red-legged frogs are injured or killed. The potential for this effect to occur can be reduced by thoroughly informing workers of the importance of preventing hazardous materials from entering the environment, locating staging and fueling areas a minimum of 65 feet from riparian areas or other water bodies, and by having an effective spill response plan in place.

Uninformed workers could disturb, injure, or kill gobies, snakes, shrimp, or red-legged frogs. The potential for this effect to occur may be greatly reduced by informing workers of the presence and protected status of these species and the measures that are being implemented to protect them during project activities.

The restoration projects that would utilize the proposed authorization are intended to provide additional habitat for, and increased populations of, steelhead and salmon in the respective project areas. These fish prey on the shrimp, the goby, and the red-legged frog. The effects of potentially increasing predator populations on the shrimp and red-legged frog cannot be accurately predicted at this time. Shrimp, gobies, salmon and steelhead occurred in coastal watersheds prior to the onset of human disturbance. Although we anticipate some predation of shrimp and red-legged frogs by salmonid fishes, this level of predation is not expected to appreciably alter the population structure within the project areas.

While the activities of each proposed project are not specifically addressed individually, they are all within anadromous fish-bearing streams, and the areas around them. The projects are typically no larger than 1000 contiguous feet, and generally short in duration with projects taking place over a short work window during a calendar year.

It is unlikely that several Program projects would be conducted concurrently in the same location. Additionally, the need to receive individual appendages will ensure that in this rare case the effects of several actions in an area or watershed could be adequately described and additional potential minimization and avoidance measures for federally listed species.

The Corps' proposed authorization would affect a small number of shrimp, gobies, snakes, and red-legged frogs, if any occur in the areas that would be temporarily disturbed by project activities. Due to the small size of the work areas, the temporal nature of the projects, the implementation of the projects in the dry season, and the proposed protective measures, we anticipate that few California red-legged frog, California freshwater shrimp, San Francisco garter snake, or tidewater goby will be killed or injured during project activities. The areas disturbed by Program projects constitute a small portion of the available shrimp, goby, snake, and red-legged frog habitat throughout the Corps' San Francisco District's jurisdiction; additionally, disturbed areas will be restored and planted with native plants. Restoration and enhancement of riparian vegetation and stream complexity in project sites is likely to increase the number and quality of cover sites and the diversity and abundance of prey species for California red-legged frogs, California freshwater shrimp, San Francisco garter snake, and tidewater goby. The proposed authorization is generally likely to improve the quality of habitat for the tidewater goby and red-legged frog in areas affected by projects implemented under the Program.

California Red-legged Frog

Work activities, including noise and vibration, may cause red-legged frogs to leave the work area. This disturbance may increase the potential for predation and desiccation. Minimizing the area disturbed by project activities may reduce the potential for dispersal resulting from the action. Red-legged frogs are more likely to disperse overland in mesic conditions. Because the CDFW would primarily be executing the proposed projects during the dry season, these uplands impacts are less likely. As long as no substantial rainfall (substantial rainfall = greater than 0.5 inch of rain in a 24-hour period) occurs, California red-legged frogs dispersing through the uplands are unlikely to be at risk. Individuals seeking refuge in the stream are likely to move into adjacent habitat outside of the project. The conservation measure where biologists relocate red-legged frogs will further minimize adverse effects to individual red-legged frogs.

Work in flowing streams or in floodplains could cause unusually high levels of siltation downstream. This siltation could smother eggs of the red-legged frog and alter the quality of the habitat to the extent that use by individuals of the species is precluded. Implementing best management practices for erosion control and reducing the area to be disturbed to the minimum necessary should decrease the amount of sediment that is washed downstream as a result of project activities.

The Program will not result in the permanent loss of red-legged frog habitat. The restoration projects will provide more stable stream banks, better water quality through decreased erosion and sediment loading, and shelter along stream banks for red-legged frogs. Additionally, many of the projects will improve red-legged frog habitat by creating additional pools and providing a more natural water flow regime by eliminating or altering fish passage barriers. The restoration projects will contribute to the local recovery of the red-legged frog by removing non-native predators such as bullfrogs, which out-compete and ultimately displace red-legged frogs from suitable habitat, and by improving the riparian buffer which will reduce the movement of pesticides into the aquatic environment.

<u>Critical Habitat of the California Red-legged Frog</u>

The critical habitat units in the action area contain the physical and biological features that are essential for the conservation of the species. The units are currently occupied by California red-legged frogs and contain permanent and ephemeral aquatic habitat for breeding and non-breeding activities (PCEs 1 and 2), and upland habitat for foraging, dispersal, and shelter (PCEs 3 and 4). Some of these units include areas with high quality habitat, while others provide important connectivity between habitats or unique habitat characteristics. We consider the PCEs in the action area to be functioning at an overall high level.

Project locations and size will vary throughout the life of the RGP. Specific locations and project areas are not known until projects are awarded grant funding, and the CDFW provides the Service a notification of Program projects for each individual year. Based on projects funded in the past, the total area of all projects is still small relative to the acres of critical habitat in the action area.

Access and construction activities, including excavation and removal of vegetation, may temporarily reduce the quality and/or availability of foraging, dispersal, and sheltering habitat for California red-legged frogs. Creek diversion and dewatering may temporarily reduce the quality and/or availability of permanent and ephemeral aquatic habitat for California red-legged frog. Working in the dry season, restricting the size of project areas, and implementing best management practices for dewatering and erosion control will help minimize effects to these habitats. Ultimately, creek stabilization and restoration will reduce erosion in and downstream of the action area, and placement of structures such as large woody debris would create sheltering habitat, enhance pool formation. Though Program projects may cause temporary impacts to critical habitat during implementation, these projects are expected to enhance habitat for California red-legged frogs and improve the condition of critical habitat in these stream reaches overall.

California Freshwater Shrimp

California freshwater shrimp that are adjacent to project sites may be incidentally taken in the form of harm, harassment injury, or mortality as a result of temporary disturbances from project activities. With implementation of the conservation measures, only low levels of injury or mortality of shrimp are anticipated. Injury or mortality to shrimp was not incurred or documented in any previous salmonid or shrimp surveys conducted in the Russian River basin. While the identification of habitat, net capture and release that will be conducted under this Program will result in the low likelihood of injury or mortality to shrimp, it is unreasonable to assume that injury or mortality will never occur. In addition, injury to or mortality of shrimp during a dewatering rescue and relocation is more likely due to their fragile size and requirement for an aquatic environment.

Work in flowing streams or in floodplains could cause unusually high levels of siltation downstream. Although shrimp are usually able to survive in poor water quality conditions, this siltation could alter the quality of the habitat. Siltation also could fill slow-moving pools, reducing the extent or quality of shrimp habitat near the project area. Implementing best management practices for erosion control and reducing the area to be disturbed to the minimum necessary should decrease the amount of sediment that is washed downstream as a result of project activities. Implementation of projects under the Corps' proposed authorization may result in the loss of shrimp habitat. Installation of check dams, rock weirs, log weirs and wing deflectors may prevent shrimp from dispersing along streambanks. The potential for this effect may be reduced by ensuring that project proponents are thoroughly briefed by CDFW on the locations of shrimp streams, by designing projects to match the historical stream ecosystem as closely as possible, and by ensuring that check dams and weirs do not span any creeks known to support shrimp.

Many activities in this Program will benefit the California freshwater shrimp. Riparian plantings and cattle exclusion fences will improve habitat quality in California freshwater shrimp streams and their tributaries. Increased riparian cover will increase habitat complexity and root density on streambanks. Riparian vegetation will allow shrimp to disperse more easily and will stabilize water temperatures in the creeks. Exclusionary fencing will reduce cattle impacts to the creek such as overgrazing, streambank trampling, and soil compaction. An increase in sinuosity, side channels, and an increase in channel complexity will reduce erosion, incision of habitat and sedimentation of downstream reaches. Objectives in the shrimp's recovery plan includes protection of existing populations, removal of threats to these populations, and enhancement of habitat for native aquatic species within the shrimp's historic range. Projects performed under the Restoration Program will aid in the implementation of these recovery objectives.

San Francisco Garter Snake

Direct effects to of San Francisco garter snake may include injury or mortality from being crushed by earth moving equipment, construction debris, and worker foot traffic. These effects would be reduced by minimizing and clearly demarcating the boundaries of the action area and equipment access routes and locating staging areas outside of riparian areas or other water bodies and worker education.

Work activities, including noise and vibration, may harass San Francisco garter snakes by causing them to leave the work area. This disturbance may increase the potential for predation. Minimizing the area disturbed by proposed action activities would reduce the potential for dispersal resulting from the action.

The potential exists for uninformed workers to intentionally or unintentionally harass, injure, harm, or kill a San Francisco garter snake. The potential for this impact will be greatly reduced by informing workers of the presence and protected status of this species and the measures that are being implemented to protect it during proposed action activities.

Temporary effects from loss of vegetative cover that provides sheltering and foraging habitat for the species would be minimized and compensated for by implementing the proposed restoration actions.

Tidewater Goby

Dewatering

The projects covered under CDFW have the potential need to isolate the work area with cofferdams and bypass streamflow around construction sites. The extent of channel that will be dewatered or disturbed will not exceed 1,000 contiguous feet of stream reach. In stream reaches where listed species are present during construction, efforts will be made to design construction activities to avoid complete dewatering of a channel cross-section in a manner that maintains fish passage through the construction area. Dewatering encompasses placing temporary barriers, such as a cofferdam, to isolate the work area, rerouting stream flow around the dewatered area, pumping water out of the isolated work area, relocating fish from the work area (discussed separately), and restoring the project site upon project completion. Any project types that may involve in-water work have the potential to require dewatering and so reduce available habitat for listed species as well as degrade their habitat. Dewatering of a project reach may result from a variety of project types as described above in the Project Description section and include channel filling projects where existing aquatic habitat in incised channels is filled with sediment during grading activities.

Gobies that avoid capture in the project work area during relocation efforts have the potential to die due to desiccation, predation, thermal stress, or by being crushed by equipment or foot traffic if not found by Service-approved fisheries biologists while water levels within the reach recede. Because gobies are very small, especially in the planktonic larval form; it is not possible to relocate and move all the larval or small juvenile size classes to permanently watered habitat outside the work area nor is it likely that all fish will successfully move out of the work area as the water level is lowered. Any remaining fish in the area that is dewatered or has had water levels lowered may die from desiccation, predation, or other causes.

However, it is expected that the number of individuals that will be killed as a result of barrier placement and stranding during site dewatering activities is very low, likely less than one percent of the total number of individuals of a species in the project area. The low number of individuals expected to be injured or killed as a result of dewatering is based on the avoidance behavior to the disturbance, the small area affected during dewatering at each site, the low number of individuals in the typically degrading habitat conditions common to proposed restoration sites, and the low number of individuals expected to be present within each project site after relocation activities.

Handling and Relocation

All project sites that require dewatering will include species relocation. A Service-approved qualified biologist will capture and relocate all gobies away from the restoration project work site to minimize adverse effects of dewatering. Individuals in the immediate project area will be captured by a fine-meshed seine (1/8 inch diameter) and will then be transported and released to a suitable instream location. At this time, they are susceptible to being injured or crushed by workers while they are entangled in or being removed from netting. Any species collecting gear, whether passive or active has some associated risk to individuals, including stress, disease transmission, injury, or death. The amount of injury and mortality attributable to species capture varies widely depending on the method used, the ambient conditions, and the expertise and experience of the field crew. Nonetheless, it is anticipated that few, if any, adult gobies will be killed during monitoring and relocation. Previous surveys, over several years and in other locations, have almost always successfully captured and released many gobies without any known mortalities, and previous relocation efforts for other restoration projects within Humboldt County have also seen minimal goby mortality rates (0.002% [4 out of 2,156 moved]; Ross Taylor & Associates, unpublished data). No previous FRGP projects have encountered or relocated gobies within the years of 2016-2020, but data from previous CDFW funded restoration projects indicate mortality rates associated with fish relocation sites are less than 3% and the mean mortality rates for all sites are less than 1% (Collins 2004).

In addition, pre and post project implementation effectiveness monitoring will be conducted at select sites. Species sampling will generally require wading by individuals operating the sampling gear and would possibly agitate the stream bottom substrate where the gear is deployed. If gobies are present in these sites, it is possible monitoring activities could cause goby burrows that contain eggs or juveniles to be crushed. It is anticipated that few, if any, adult gobies will be killed during monitoring.

Sedimentation

All project types involving ground disturbance in or adjacent to streams are expected to increase turbidity and suspended sediment levels within the project work site and downstream areas. The re-suspension and deposition of instream sediments is an indirect effect of construction equipment and gravel entering the river. Short-term increases in turbidity and suspended sediment levels associated with construction can cause excessive sedimentation of burrows containing eggs and adult males and could degrade water quality and result in injury or mortality to gobies. To minimize the potential of project related sediments from entering the watercourse, all projects will inc1ude construction erosion and sediment control BMPs as described under Description of the Proposed Action.

Physical disturbance

Proposed activities will temporarily disturb aquatic habitat supporting tidewater gobies leading to the potential for injury and death as they are forced and relocated into potentially less suitable habitat. Negative effects to the species could occur through the potential alteration of breaching regime of lagoons from the removal of barriers that act to reduce tidal exchange. This could result in the loss of suitable habitat when water velocity increases, and protected areas become exposed to a high degree of water volume fluctuation causing individuals to be flushed out. These effects are expected to be minimal and temporary to the duration of project construction, since after project completion new channels and aquatic areas created from the project will function as suitable habitat for the species.

Furthermore, noise, motion, and vibration produced by heavy equipment is expected at most instream restoration sites, and these effects could result in collapse of tidewater goby burrows if these disturbances occur close enough to occupied tidewater goby habitat. However, the equipment will be used infrequently, in short-term periods, and stationed outside of the active channel, minimizing the potential effects to gobies.

Hazardous Spills

The use of heavy equipment creates a risk of accidental spills of fuel, lubricants, hydraulic fluid, coolants, and other containments. Petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain polycyclic aromatic hydrocarbons (PAHs), which can be acutely toxic to aquatic organisms at high levels of exposure and can cause sub-lethal adverse effects to aquatic organisms such as gobies at lower concentrations. Equipment refueling, fluid leakage, and maintenance activities within and near the stream channel pose some risk of contamination and potential adverse effects on listed species. In addition to toxic chemicals associated with construction equipment, water that comes into contact with wet cement during construction of a restoration project can also adversely affect water quality and may harm listed species. Herbicide application and herbicide drift could also adversely affect water quality conditions. The likelihood that death or injury to gobies could occur because of sedimentation or pollution as a result of construction activities is considered to be low, due to the robust conservation measures and best management practices proposed to prevent hazardous spills.

<u>Critical Habitat of the Tidewater Goby</u>

The decline of the goby throughout its range can be attributed to water diversions, dredging, pollution, sedimentation, and urban development on adjacent lands. These threats continue to affect many of the remaining goby populations (Service 1994, 2008). Water diversions can either isolate or completely eliminate habitat, while pollution and run-off from development can completely contaminate habitat. Excessive sedimentation may degrade substrate conditions needed for reproduction and can result in the loss of habitat as shallow wetland areas fill in and become dewatered upland habitat (Service 1994, 2005, 2008). Additionally, changes in tidal influence from the removal of barriers that act to mute tidal exchange can result in the loss of suitable habitat when water velocity increases and protected areas become exposed from a high degree of water volume fluctuation (Service 2006).

Individual critical habitat units provide conservation benefits to the species. We assume that goby presence is spatially correlated with the quantity, quality, and availability of primary constituent elements (Service 2006). Activities that result in a reduction in the quantity, quality, and availability of primary constituent elements within critical habitat units, can adversely affect the function and conservation role of the affected unit. The critical habitat units in the action area contain the physical and biological features that are essential for the conservation of the species. The units are currently occupied by tidewater gobies and contain suitable aquatic habitat for breeding and non-breeding activities. We consider the PCEs in the action area to be functioning at an overall high level.

Program project locations and size will vary throughout the life of the RGP. Specific locations and project areas are not known until Program projects are awarded grant funding, and the CDFW provides the Service a notification of Program projects for each individual year. Based on projects funded in the past, the total area of all projects is still small relative to the acres of critical habitat in the action area.

Project access and construction activities, including excavation and removal of vegetation, may temporarily reduce the quality and/or availability of nesting habitat for tidewater gobies by increasing sedimentation to the nearby streams. Creek diversion and dewatering could also temporarily reduce the quality and availability of suitable habitat for tidewater goby. The removal of barriers to anadromous fish passage could also adversely affect goby habitat by exposing the areas to increased water fluctuation. The creation of additional salt marsh habitat, and other estuarine habitats suitable for gobies, as well as working in the dry season, restricting the size of project areas, and implementing best management practices for dewatering, relocations, and erosion control will help minimize adverse effects to these habitats.

Ultimately, creek stabilization and restoration will reduce erosion in and downstream of the action area, and placement of native aquatic vegetation would create sheltering habitat. Though Program projects may cause temporary impacts to critical habitat during implementation, these projects are expected to expand, create, and enhance suitable habitat for tidewater goby and improve the condition of critical habitat in these stream reaches overall.

Cumulative Effects

Cumulative effects include the effects of future tate, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. During this consultation, the Service did not identify any future non-federal actions that are reasonably certain to occur in the action area of the proposed project.

Conclusion

After reviewing the current status of the California red-legged frog, California freshwater shrimp, San Francisco garter snake, and tidewater goby, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the RGP-12 for the California Department of Fish and Wildlife's Fisheries Restoration Grant Program, as proposed, is not likely to jeopardize the continued existence of the California red-legged frog, the California freshwater shrimp, the San Francisco garter snake, or the tidewater goby.

The Service reached this conclusion because the project-related effects to the species, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding recovery or reducing the likelihood of survival of the species based on the following:

1) Successful implementation of the conservation measures proposed by the Corps and the CDFW will minimize the potential adverse effects of Program project activities on the California red-legged frog, California freshwater shrimp, San Francisco garter snake, and tidewater goby;

2) The persistence of the shrimp, goby, garter snake and red-legged frog in the affected area would not be diminished by the activities covered under this programmatic consultation;

3) Few, if any, California red-legged frogs, California freshwater shrimp, San Francisco garter snakes, or tidewater gobies are likely to be killed or injured during project activities; and

4) The overall quality of California red-legged frog, California freshwater shrimp, San Francisco garter snake, and tidewater goby breeding, foraging, and dispersal habitat would be improved as a result of improved water quality, reduced sedimentation, and habitat enhancement associated with Program projects. This improvement would offset any injury or mortality or temporary adverse effects to habitat that might result from implementation of Program activities.

After reviewing the current status of designated critical habitat for the California red-legged frog, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the RGP-12 for the California Department of Fish and Wildlife's Fisheries Restoration Grant Program, as proposed, is not likely to destroy or adversely modify designated critical habitat for this species. The Service reached this conclusion because the project-related effects to the designated critical habitat, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding the function of the California red-legged frog critical habitat to serve its intended conservation role for the species based on the following:

1. Successful implementation of the conservation measures described in this biological opinion will minimize the adverse effects on the PCEs of critical habitat; and

2. The effects to California red-legged frog critical habitat are small and discrete, relative to the entire area designated, and are not expected to appreciably diminish the value of the critical habitat or prevent it from sustaining its role in the conservation of the California red-legged frog.

After reviewing the current status of designated critical habitat for the tidewater goby, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the RGP 12 for the California Department of Fish and Wildlife's Fisheries Restoration Grant Program, as proposed, is not likely to destroy or adversely modify designated critical habitat for this species. The Service reached this conclusion because the project-related effects to the designated critical habitat, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding the function of the tidewater goby critical habitat to serve its intended conservation role for the species based on the following:

1. Successful implementation of the conservation measures described in this biological opinion will minimize the adverse effects on the PCEs of critical habitat; and

2. The effects to tidewater goby critical habitat are small and discrete, relative to the entire area designated, and are not expected to appreciably diminish the value of the critical habitat or prevent it from sustaining its role in the conservation of the tidewater goby.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by Service regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

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

Amount or Extent of Take

California Red-legged Frog

The Service anticipates that incidental take of California red-legged frog will be difficult to detect due to its life history and ecology. Specifically, California red-legged frog can be difficult to locate due to their cryptic appearance, and finding a dead or injured individual is unlikely due to their relatively small size. Losses of California red-legged frog may also be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in water regime at their breeding ponds, or additional environmental disturbances. Consequently, we are unable to reasonably anticipate the actual number of California red-legged frogs that would be taken by the proposed project; however, we must provide a level at which formal consultation would have to be reinitiated.

There is a risk of harm, injury and mortality as a result of the proposed activities, and temporary loss/degradation of suitable habitat, however, proper implementation of all measures should be effective in minimizing incidental take due to harm, injury, or mortality. The Environmental Baseline and Effects Analysis sections of this biological opinion indicate that adverse effects to California red-legged frogs would likely be low given the nature of the proposed activities, and we, therefore, anticipate that take of California red-legged frogs would also be low. We also recognize that for every California red-legged frog found dead or injured, other individuals may be killed or injured that are not detected; so when we determine an appropriate take level, we are anticipating that the actual take would be higher and we set the number below that level.

Similarly, for estimating the number of California red-legged frogs that would be taken by capture, we cannot predict how many may be encountered for reasons stated earlier. While the benefits of relocation (i.e., minimizing mortality) outweigh the risk of capture, we must provide a limit for take by capture at which consultation would be reinitiated because high rates of capture may indicate that some important information about the species in the action area was not apparent (e.g., it is much more abundant than thought).

Therefore, if 3 adult or juvenile California red-legged frogs or 10 percent of tadpoles encountered are wounded or killed at any given project site, the Corps must contact our office immediately to reinitiate formal consultation. If ten adults or juveniles are captured and relocated at any given project site, the Corps must contact our office immediately to evaluate if reinitiation is necessary. Any California red-legged frogs wounded or killed as a result of relocation activities will be counted toward the totals. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions. Incidental take limits are depicted in Table 2.

Table 2. Incidental take limits per project site

Injury or Mortality	Limit
Adults/Juveniles	3
Tadpoles	10%

Capture and Relocation	Limit
Adults/Juveniles	10

California Freshwater Shrimp

The Service expects that incidental take of the California freshwater shrimp will be difficult to detect or quantify. The aquatic nature, cryptic coloration, secretive habits, and small body size of the species make the finding of a dead specimen unlikely: losses may be marked by seasonal fluctuations in numbers or other causes: and the species occurs in habitat that makes them difficult to detect. Due to the difficulty in quantifying the number of shrimp that will be taken as a result of the proposed action, the Service estimates that all individuals captured within the action area will be subject to incidental take in the form of non-lethal harm and capture. The Service anticipates lethal take of 5% of all captured California freshwater shrimp as a result of the proposed project.

San Francisco Garter Snake

The Service anticipates that incidental take of the San Francisco garter snake will be difficult to detect due to their relatively small size. The project footprint includes vegetative cover, rocks, and debris which provide cover for the San Francisco garter snake. Furthermore, finding an injured or dead San Francisco garter snake is unlikely due to their relatively small body size, rapid carcass deterioration, and likelihood that the remains will be removed by a scavenger or indistinguishable amongst the disturbed soil and debris. Losses of the San Francisco garter snake may also be difficult to quantify due to seasonal/annual fluctuations in their numbers due to environmental or human-caused disturbances. The Service anticipates that some subset of San Francisco garter snakes within the action area will be subject to incidental take annually in the form of relocation and non-lethal harm. The Service anticipates five (5) San Francisco garter snakes would be killed or injured over the term of this Biological Opinion, not to exceed one (1) per year, as a result of Program project-related activities.

Tidewater Goby

We anticipate that some tidewater gobies could be taken as a result of the proposed action. We expect the incidental take to be in the form of wounding or killing of individuals if they are within the project area during project activities and not successfully captured or excluded from the project area by fish screens, or if they are mishandled during relocation.

We cannot quantify the number of gobies that could be affected by the proposed projects due to large seasonal changes in goby distribution and abundance; for example goby populations can experience rapid changes in abundance within a single year. Other individuals may not be detected due to the variability of environmental conditions, sampling location within a site, and vegetation and substrate type. Finding dead or injured tidewater goby is unlikely. The protective measures proposed by the Corps are likely to prevent mortality or injury of most individuals.

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

Given that gobies may continue to colonize and increase recruitment levels during the project as areas are restored, it is impractical to estimate the number of possible tidewater goby in the project areas or to base our analysis of take on the number of tidewater goby present in the project area at a time well before project implementation. Therefore, we have reviewed and established estimated levels of take based on the percentage of handled individuals that are observed dead or injured rather than based on a percentage of numbers expected to occur. Based on data from other goby relocation projects (e.g. Martin Slough Restoration Project, and Ocean Ranch Restoration Project) that took place within the Humboldt Bay surrounding area, we estimate a 99.99% survival rate of translocated gobies (RTA, unpublished data; CDFW 2021).

Thus, we established the following percentage-based threshold that, if exceeded, will trigger re-initiation of consultation:

- A maximum mortality rate of 3% of handled adult gobies due to capture and relocation efforts, per year, per project.

Incidental take is expected to occur in the form of harm from project activities that may result in the relocation or crushing of gobies in the area, which can result in direct mortality, increased stress, elevated risk of predation, or may have other biological implications that reduce goby survival.

Upon implementation of the following reasonable and prudent measures, incidental take of California red-legged frog, California freshwater shrimp, San Francisco garter snake, and tidewater goby associated with the RGP 12 for the California Department of Fish and Wildlife's Fisheries Restoration Grant Program will become exempt from the prohibitions described in section 9 of the Act. No other forms of take are exempted under this opinion.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species. Although we anticipate some incidental take to occur, the implementation of the conservation measures proposed should ultimately result in avoidance and minimization of adverse effects.

Reasonable and Prudent Measures

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

All necessary and appropriate measures to avoid or minimize effects on the California red-legged frog, California freshwater shrimp, San Francisco garter snake, and the tidewater goby resulting from implementation of the proposed project have been incorporated into the project's proposed conservation measures. Therefore, the Service believes the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of the California red-legged frog, California freshwater shrimp, San Francisco garter snake, and the tidewater goby:

1) All conservation measures, as described in the biological assessment and restated here in the Project Description section of this biological opinion, shall be fully implemented and adhered to. Further, this reasonable and prudent measure shall be supplemented by the terms and conditions below.

Terms and Conditions

To be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measure described above and outline reporting and monitoring requirements. These terms and conditions are nondiscretionary.

1. 2010 4th edition California Salmonid Stream Habitat Restoration Manual shall be available and accessible to all grantees.

2. The permittee, CDFW, shall fully implement all the conservation measures as described in this Programmatic Biological Opinion.

3. The permittee, CDFW shall require that all personnel associated with each Program project are made aware of the conservation measures and the responsibility to implement them fully.

4. The permittee, CDFW, shall report all take not exempted by the biological opinion to Ryan Olah (ryan_olah@fws.gov), at the letterhead address, (916) 414-6623 or by e-mail.

5. CDFW will provide post-construction monitoring, reporting, and tracking on an annual basis that will describe all work that was completed and document work areas after construction is complete. All audits of grantees by CDFW will also be provided to the Service.

Reporting Requirements

Pursuant to 50 CFR 402.14(i)(3), the Corps must report the progress of the action and its impact on the species to the Service as specified in this incidental take statement. For all projects, the CDFW will submit an annual report describing implemented projects to the Sacramento Fish and Wildlife Office, the Ventura Fish and Wildlife Office, and the Arcata Fish and Wildlife Office by January 31 of each year.

The report will include:

1. A table documenting the number of California red-legged frogs, California freshwater shrimp, San Francisco garter snakes, and tidewater gobies killed, injured, and handled during each Program project under the Corps authorization.

2. A summary of how the terms and conditions and the conservation measures worked.

3. Any suggestions of how the conservation measures could be revised to improve conservation of these species while facilitating compliance with the Act.

Salvage and Disposition of Individuals:

As part of this incidental take statement and pursuant to 50 CFR 402.14(i)(1)(v), upon locating a dead or injured California red-legged frog, California freshwater shrimp, San Francisco garter snake, or tidewater goby, initial notification within 3 working days of its finding must be made by telephone and in writing (or electronic mail) to the Sacramento fish and Wildlife Office (916-414-6623). The report must include the date, time, location of the carcass, a photograph, cause of death or injury, if known, and any other pertinent information. Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1) Sightings of any listed or sensitive animal species should be reported to CDFW's CNDDB. A copy of the reporting form and a topographic map clearly marked with the location the animals were observed should also be provided to the Service.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION—CLOSING STATEMENT

This concludes formal consultation on the RGP 12 for the California Department of Fish and Wildlife's Fisheries Restoration Grant Program. As provided in 50 CFR §402.16(a), reinitiation of consultation is required and shall be requested by the federal agency or by the Service 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 take 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 the biological opinion; or written concurrence, or

4) If a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any questions regarding this biological opinion, please contact Ryan Olah (ryan_olah@fws.gov), at the letterhead address, or at (916) 414-6623.

Sincerely,

Michael Fris
Field Supervisor

ec:
Tanya Sommer, Field Supervisor, Arcata Fish and Wildlife Office, Arcata, CA
Leilani Takano, Assistant Field Supervisor, Ventura Fish and Wildlife Office Ventura, CA
U.S. Army Corps of Engineers, Regulatory Division, Sacramento, CA

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PERSONAL COMMUNICATIONS

Gordon, R. and J. Bennett. Electronic mail communication from Rebecca Gordon and Jesse Bennett, Service, Carlsbad FWO, to Valerie Hentges, Service, Sacramento FWO, dated October 12, 2017.

Mabe, J. 2017. Phone conversation from Jeff Mabe, U.S. Forest Service, Eldorado National Forest, to Ian Vogel, Service, Sacramento FWO, dated June 6, 2017.

Yang, D. and J. Martin. Electronic mail communication from Dou-Shuan Yang and Jacob Martin, Service, Ventura FWO, to Valerie Hentges, Service, Sacramento FWO, dated July 5, 2017.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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May 18, 2022 **Refer to NMFS No:** WCRO-2021-03365

James Mazza
Acting Chief, Regulatory Division
U.S. Department of the Army
San Francisco District, Corps of Engineers
450 Golden Gate Avenue, 4th Floor, Suite 0134
San Francisco, California 94102-3406

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the NOAA Restoration Center and Army Corps of Engineers' (Corps) Reissuance of Regional General Permit 12 (RGP-12)

Dear Mr. Mazza:

Thank you for your letter of December 14, 2021, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the San Francisco Corps of Engineers' reissuance of RGP-12. Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson–Stevens Fishery Conservation and Management Act (MSA) [16 U.S.C. 1855(b)].

The enclosed biological opinion describes NMFS' analysis of likely effects of reissuance of RGP-12 on threatened Southern Oregon/Northern California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*) and endangered Central California Coast (CCC) coho salmon; threatened Coastal California (CC) Chinook salmon (*O. tshawytscha*); threatened Northern California (NC) steelhead (*O. mykiss*), threatened Central California Coast (CCC) steelhead, and endangered South-Central California Coast (S-CCC) steelhead; and designated critical habitat for these species in accordance with Section 7 of the ESA. In the biological opinion, NMFS concludes reissuance of RGP-12 is not likely to jeopardize the continued existence of these ESA-listed species, nor is it likely to adversely modify salmonid critical habitat. NMFS anticipates take of these species will occur as a result of reissuance of RGP-12, and has included an incidental take statement with the enclosed biological opinion.

In addition, NMFS concurs with the Corps' determination that the proposed action is not likely to adversely affect the southern Distinct Population Segment (DPS) of North American green sturgeon *(Acipenser medirostris)*, the southern DPS Pacific eulachon (*Thaleichthys pacificus*), or designated critical habitats for these species.

NMFS also reviewed the likely effects of the proposed action on EFH, pursuant to section 305(b) of the MSA (16 U.S.C. 1855(b)). Based on our review, the Program will operate within an area identified as EFH for fish species managed under the following Fishery Management Plans:

Pacific Coast Salmon (PFMC 2016), Coastal Pelagic Species (PFMC 2019a), and Pacific Coast Groundfish (PFMC 2019b). The Program includes design, staging, monitoring, and adaptive management strategies recommended by NMFS to avoid or minimize potential adverse effects to EFH, and elements that promote species recovery. Thus, no EFH conservation recommendations are provided.

Please contact Julie Weeder at NMFS' Northern California Office at 707-825-5168 or Julie.Weeder@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: Jeffrey Jahn, NMFS, Arcata, California, Jeffrey.Jahn@noaa.gov
Erin Seghesio, NMFS, Santa Rosa, California, Erin.Seghesio@noaa.gov
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Copy to E-File: FRN 151422WCR2021AR003365

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response

U.S. Army Corps of Engineers' Reissuance of Regional General Permit 12

NMFS Consultation Number: WCRO-2021-03365
Action Agency: U.S. Army Corps of Engineers

Affected Species and NMFS' Determinations:

ESA-Listed Species	**Status**	**Is Action Likely to Adversely Affect Species?**	**Is Action Likely to Jeopardize the Species?**	**Is Action Likely to Adversely Affect Critical Habitat?**	**Is Action Likely to Destroy or Adversely Modify Critical Habitat?**
Southern Oregon/Northern California Coast Coho Salmon (*Oncorhynchus kisutch*)	Threatened	Yes	No	Yes	No
Central California Coast Coho Salmon (*O. kisutch*)	Endangered	Yes	No	Yes	No
California Coastal Chinook Salmon (*O. tshawytscha*)	Threatened	Yes	No	Yes	No
Northern California Steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No
Central California Coast Steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No
South Central California Coast Steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No
Southern Green Sturgeon (*Acipenser medirostris*)	Threatened	No	N/A	No	N/A
Southern Eulachon (*Thaleichthys pacificus*)	Threatened	No	N/A	No	N/A

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	No
Coastal Pelagic Species	Yes	No
Pacific Coast Groundfish	Yes	No

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

Issued By:

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Date: May 18, 2022

Table of Contents

1. Introduction

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

1.1 Background

NOAA's National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.), as amended, and implementing regulations at 50 CFR part 402.

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

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at California Coastal NMFS office.

1.2 Consultation History

In November 2019, the California Department of Fish and Wildlife (CDFW) and the San Francisco District Regulatory Division of the U.S. Army Corps of Engineers (Corps) began coordination with NMFS West Coast Region's California Coastal Office (NMFS) to revise and reissue Regional General Permit 12 (RGP-12), which is held by CDFW. RGP-12 authorizes projects funded and/or approved under CDFW's grant programs within the San Francisco Corps district, including the Fisheries Restoration Grants Program (FRGP).

The Corps sought NMFS consultation on reissuance of RGP-12 due to potential effects to ESA-threatened Southern Oregon/Northern California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*) and endangered Central California Coast (CCC) coho salmon; threatened California Coastal (CC) Chinook salmon (*O. tshawytscha*); threatened Northern California (NC) steelhead (*O. mykiss*), threatened Central California Coast (CCC) steelhead, and threatened South-Central California Coast (S-CCC) steelhead, as well as designated critical habitats for these species. In addition, the Corps anticipated potential effects to Essential Fish Habitat (EFH) for three fisheries regulated under the Magnuson Stevens Fishery Conservation and Management Act (MSA): Pacific Coast Salmon, Coastal Pelagic Species, and Pacific Coast Groundfish.

The RGP-12 Biological Opinion (BO) in place when coordination started (WCR-2015-2400) was set to expire on December 1, 2020. Due to extensive anticipated revisions to the proposed action and the processing time needed to reissue RGP-12, the Corps determined it would not be possible to reissue an RGP-12 reflecting these revisions prior to the expiration date of the then-current BO (WCR 2015-2400). Therefore, the Corps sought NMFS consultation on a time extension of the unchanged RGP-12 for two additional field seasons. On November 6, 2020, NMFS provided the Corps with a BO for this extension (WCRO-2020-02938). This BO expires on December 31, 2022.

In late 2019, throughout 2020 and 2021, and during the first four months of 2022, staff from CDFW, the Corps, and NMFS met regularly to:

- Add restoration work in tidal areas, as well as additional restoration methods, to the proposed action.
- Discuss NMFS comments on draft versions of the Biological Assessment (BA).
- Discuss the Instream Bank Stabilization project type and the living shorelines portion of the Instream Habitat Improvement project type.

On December 13, 2021, NMFS received a letter from the Corps requesting initiation of Endangered Species Act (ESA) and MSA consultation on their reissuance of RGP-12 (the proposed action), along with a final BA. The same day, NMFS notified the Corps that the initiation letter and BA included Central Valley ESA-listed salmonids that are not present in the action area. On December 14, 2021, the Corps transmitted a revised initiation letter to NMFS omitting the Central Valley salmonids from the consultation request. NMFS initiated ESA and MSA consultation on this proposed action on December 14, 2021. During April and early May 2022, NMFS provided technical assistance to CDFW and the Corps on suggested revisions to the BA. On May 16, 2022, CDFW submitted a revised BA to the Corps and NMFS that included updated take estimates for Program activities, and omitted information on Central Valley salmonids and critical habitat.

1.3 Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (see 50 CFR 402.02). Under the MSA, "Federal action" means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal agency (see 50 CFR 600.910).]

The Corps proposes to reissue RGP-12 to CDFW every 5 years[1] pursuant to section 404 of the Federal Clean Water Act of 1972, as amended (33 U.S.C. 1344 et seq.), for the placement of fill material into the waters of the United States to annually implement anadromous salmonid habitat restoration projects under CDFWs Fisheries Restoration Grant Program (Program). Projects will be implemented in various streams and rivers in portions of the following coastal counties, which are within the regulatory jurisdictional boundaries of the Corp's San Francisco District: Alameda, Contra Costa, Del Norte, Glenn, Humboldt, Lake, Marin, Mendocino, Monterey, Napa, San Benito, San Francisco, San Luis Obispo (northeast, non-coastal), San Mateo, Santa Clara, Santa Cruz, Siskiyou, Solano, Sonoma, and Trinity.

The activities funded by FRGP and implemented under RGP-12 are designed to restore habitat that will support recovery of the following ESA-listed salmonids: SONCC coho salmon, CCC

[1] The timeframe considered for this ESA analysis is ongoing and long-term.

coho salmon, CC Chinook salmon, NC steelhead trout, CCC steelhead trout, and S-CCC steelhead trout.

Projects funded through CDFW's FRGP and implemented under RGP-12 are required to complete all construction related activities within four field seasons from grant execution date. Projects must be completely closed out by their fifth year from their Proposal Solicitation Notice year. Instream restoration activities are required to be implemented annually during the summer low-flow period, typically between June 15 and November 1. Actual projects start and end dates, within this timeframe, are at the discretion of the CDFW (i.e., on the Shasta River projects must be completed between July 1 and September 15 to avoid impacts to immigrating and emigrating salmonids). Whenever possible, the work period at individual sites shall be further limited to entirely avoid periods when salmonids are present (for example, in a seasonal creek, work will be confined to the period when the stream is dry). Extensions to the work season can be granted if: 1) there is less than a 50% chance of 1.5 inches of rain predicted over any 24-hour period during the granted time extension; and 2) if CDFW determines and NMFS confirm that an extension will not result in effects that go beyond those analyzed during the ESA consultation on the proposed action, either in type or magnitude.

The proposed habitat restoration actions would provide predator escape and resting cover, increase spawning habitat, improve upstream and downstream migration corridors, improve pool to riffle ratios, and add habitat complexity and diversity. Instream structures constructed as part of the proposed action would be designed to reduce sedimentation, protect unstable banks, stabilize existing slides, provide shade, and create scour pools.

1.1.1. Oversight and Project Administration

1.1.1.1 Submittal of Project Applications for Funding and Authorization Under FRGP

Potential grantees seeking funding or authorization under FRGP will submit proposals during the annual Proposal Solicitation Notice (PSN). Grantees will have from March to April of each year to apply for that fiscal year's grant solicitation for potential inclusion into the FRGP. After closure of the PSN, projects go through two sets of review: Administrative Review, and the Technical Review Team. Administrative Review checks to ensure that all required documents for each project type have been submitted correctly and within the allotted timeframe. Once proposals have passed Administrative Review, potential projects are then assigned three reviewers from a joint effort of CDFW and National Oceanic and Atmospheric Administration (NOAA) environmental scientists/engineers to deem the proposals' ability to restore and enhance salmonid habitat as stated. Projects that pass this review are assembled into a potential funding list. Once the potential funding list has been determined, the FRGP Regulatory Coordinator works to create a California Environmental Quality Act (CEQA) Mitigated Negative Declaration (MND) to show that all projects will not have significant environmental and cultural impacts in their proposed area. Once projects have cleared CEQA Review and are deemed appropriate the funding list is brought to the CDFW Director for final approval before awards are made to potential grantees.

1.1.1.2 Project Eligibility

1.1.1.2.1 Ineligible for Funding

Projects with the following characteristics are ineligible to receive funding from the FRGP program, and are not part of the proposed action, therefore this ESA consultation document does not contemplate them further.

- Projects that are required mitigation or used for mitigation (CDFW requirement for program and CEQA/California Endangered Species Act requirement (CESA) for permitting).
- Projects that are under an enforcement action by a regulatory agency (CDFW requirement for program and CEQA/CESA requirement for permitting).
- Installation of new fish ladders or maintenance of existing ladders.
- Projects that would require the installation of a flashboard dam or head gate to guarantee project performance.
- Contain the construction of concrete-lined channels of any sort.
- Implementation projects that do not restore, recover, or enhance either salmonid populations and/or habitat.
- Projects working within vernal pool habitat.
- Projects that use gabion baskets.
- Projects where the constructed habitat would be used as a new point of water diversion.
- Projects that are likely to cause, for any Covered Species, a permanent net loss of habitat, permanent net loss of habitat function, or permanent net loss of functional value of designated or proposed critical habitat (e.g., the physical and biological features essential for the species' recovery and conservation).
- Projects that would result in any net loss of eelgrass resources.
- Placement of new tide gates where they did not previously exist.
- Use of riprap, rock slope protection, or any other form of bank protection beyond the minimum amount needed to achieve restoration project goals, as determined by CDFW.
- Use of chemically treated timbers used for grade or channel stabilization structures, bulkheads, overwater structures, or other instream structures.
- Removal of any dam under Federal Energy Regulatory Commission (FERC) jurisdiction.
- Fish hatchery/fish stocking projects.
- Watershed stewardship training.
- Salmon in the classroom projects.
- Projects involving obstruction blasting (with explosives).

1.1.1.2.2 Ineligible for Programmatic Permitting

Projects with the following characteristics are eligible for FRGP funding but would be ineligible for coverage under this consultation, unless the variance process (section 2.2.4) results in their eligibility, such projects must seek separate ESA consultation.

- Projects requiring dewatering of more than 1,000 contiguous feet of stream at any given time.

- Projects that will result in handling the same fish multiple times during sequenced dewatering events during the same year.
- Projects that include in-water impact pile driving that is expected to exceed the Interim Pile Driving Criteria (FHWG 2008) (or current Pile Driving Criteria when the 2008 criteria are updated).

1.1.1.3 Project Tracking and Annual Reporting

Projects funded through the Program will be tracked through CDFW's WebGrants database from project proposal submission through the final project closeout. All projects are assigned a CDFW Grant Managers that oversees project deliverables to meet the proposed metrics. In order for grantees to begin implementation each year, projects must acquire a Notice to Proceed showing that all appropriate biological and cultural surveys along with project objectives have been met.

In addition, each year on March 15, CDFW will send the Corps, United States Fish and Wildlife Service (USFWS), and NMFS a notification list detailing new and ongoing projects that are currently working under RGP-12. The notification list will include the following information: Project application identification number, FRGP grant number, project type, grant status, project title, project description, project applicant, county, CDFW region, USFWS/NOAA office jurisdiction, HUC-8 & HUC-10, stream(s), CDFW grant manager, latitude & longitude, proposed work start and end dates for that year, overall stream length treated (miles), waterbody impacted (riparian, instream, or upslope), any additional notes needed for the individual project.

Each year after the project implementation season ends on November 1, CDFW will begin analysis of data documenting effects of Program activities on juvenile listed salmonids and their critical habitat, including effects from project implementers (including monitoring activities) and effects of CDFW's monitoring activities for that calendar year. After data is validated, CDFW and Pacific States Marine Fisheries Commission staff compile the metrics into the annual reports to submit to the Corps, USFWS, and NMFS on March 1 of each year.

The annual report to NMFS will include information about each restoration project or monitoring effort carried out during the reporting period as described below.

1. Raw data provided in spreadsheet form documenting the number, HUC-10 location, and ESU or DPS of each fish relocated and killed (1 row for each project). A map indicating the location of each project.
2. Summaries of the following information across all projects in that reporting period: The number of fish of each ESU/DPS exposed to adverse effects of project activities authorized under RGP-12, and of these the number of fish killed.
    a. A comparison of the actual exposure and death data to the maximum exposure and death anticipated for each species, as described in Tables 3 and 4.
    b. The number and type of instream structures implemented within the stream channel.
    c. The length of streambank (feet) stabilized or planted with riparian species.
    d. The number of culverts replaced or repaired, including the number of miles of restored access to unoccupied salmonid habitat.
    e. The distance (miles) of road decommissioned.

f. The distance (feet) of aquatic habitat disturbed at each project site.

3. If more than 3% of the fish captured in any given location and day perish, the report will include a description of the factors that contributed to fish death at each such capture event.
4. A narrative description of any requested variances from the limitations described in the Proposed Action and their resolution.
5. A narrative description of how any project-specific information collected during the previous year (such as effectiveness monitoring) was or should be used to assess the effects and benefits of salmonid restoration projects authorized through the Program.
6. For each project that includes application of s bio-engineering methods, the length of bio-engineered streambank restored per project compared to the active channel width of that project (the former must be less than 3x the latter).
7. If the number of juveniles of any species that are harmed or killed by Program activities exceeds the annual estimate for that species by 10% or more in a single year, or by any amount in three consecutive years, the Corps and/or CDFW will coordinate with NMFS to develop an adaptive management plan to incorporate additional minimization measures in project plans as needed.
8. Through the Salmon Habitat Assessment for Restoration Effectiveness (SHARE) team, or other approaches mutually agreed upon by the Corps, CDFW, and NMFS, the Corps and/or CDFW will engage with NMFS on an ongoing basis to review the results of implementation, effectiveness, and validation monitoring, modify how such monitoring is carried out by applicants and CDFW, and assess if these results suggest opportunities to reduce impacts on listed salmonids and their habitat, to advance restoration success, or both.

1.1.1.4 Variance Process

Requests for variance from those limitations previously described in the proposed action will be considered. One potential example of a variance request would be allowing more than 1000 contiguous feet of stream to be dewatered if the water quality conditions were demonstrated to be poor (temperatures above 25° C) throughout the reach and no cold water refugia areas were identified in the area to be dewatered. Another example is a request to forego relocating fish prior to dewatering a stream reach with water temperatures greater than 25° C. The following process will be used to determine whether the proposed variance would result in effects of a nature or magnitude that were not anticipated by the Program as described in the BA (CDFW 2022). If so, the variance will not be granted.

Variance requests may be submitted by project applicants at any time. Variance requests will be evaluated by CDFW in coordination with applicable agencies. CDFW will contact applicable agencies about any variance requests, and those agencies may assist CDFW in determining whether or not the variance will be granted. CDFW will then notify the project applicants of whether or not the variance has been approved under the Program and document the resolution of each variance request in their annual report for the Program. This documentation will include the following information:

- A description of the project and the design feature within the project that needs a variance.

- The reason why the design feature requires a variance.
- The specific design variance requested.
- The rationale for why the requested variance will not result in effects that go beyond those analyzed in the BA (CDFW 2022), either in type or magnitude. In the temperature example, this rationale may include describing known temperature tolerances for species that may be present and any evidence that no salmonids have been detected in areas like this (e.g., the mainstem Eel River) above 25° C, to argue that no fish would be harmed by the requested variance.
- Whether the design variance was granted or denied, and the rationale for any denials.

1.1.2. Project Types

NMFS has evaluated the initiation package, including the final BA (CDFW 2022), and determined that it provides a comprehensive description of the proposed action. The project description (section 2.0 of the BA) is adopted here and briefly summarized below (50 CFR 402.14(h)(3)).

The Program has 20 individual project types. The project types consist of implementation projects (those with a field component) and non-implementation projects (those with no field component, such as planning). All of these project types are part of the proposed action, but because non-implementation projects have no field component, they will have no effect on listed species or their critical habitats and are not discussed further. Implementation projects may require the use of heavy equipment (i.e., self-propelled logging yarders, mechanical excavators, backhoes, etc.); however, hand labor will be used when possible. The implementation project types are:

HI – Instream Habitat Improvements: Instream habitat restoration includes the installation of boulder structures (boulder weirs; vortex boulder weirs; boulder clusters; and single and opposing boulder wing-deflectors), log and root wad structures (divide logs; digger logs; spider logs; engineered log jams; log weirs; upsurge weirs; single and opposing log wing-deflectors; and log, root wad and boulder combinations), off-channel and/or side channel habitat construction and floodplain connectivity, and projects that involve grading, such as those designed to reset the channel in freshwater or estuarine areas. The project type also includes the creation of living shorelines, salt marsh remediation, the removal of structures to improve water quality (i.e., chemically treated wood pilings), and the restoration and re-establishment of submerged aquatic vegetation (e.g., eelgrass beds). See pages 14-24 in the BA (CDFW 2022) for a more detailed description.

HB – Instream Barrier Modification for Fish Passage: Instream barriers are grade control structures (weirs), flashboard dams, small dams' debris basins, water diversion structures, log jams, beaver dams (removal or modification of beaver dams would only be in service of a larger restoration effort), waterfalls, chutes, landslides, tide gates, and log debris accumulations that prevent or impede the passage of adult and juvenile salmonids to preferred areas. Removing low-flow barriers, tide/flood gates, low-risk small dams and failing Denil and Alaska steep-pass fishways; installing rock weirs to deepen low-flow impediments; notching grade control structures; placing baffles within concrete-lined sections of channel and installing engineered stream bed ramps on small dams and on flood-control structures such as debris basins are ways to greatly improve the migration efforts of salmonids returning to natal streams. This project type includes the creation of beaver habitat and installation of beaver dam analogue structures. See pages 24-28 in the BA (CDFW 2022) for a more detailed description.

FP – Fish Passage at Stream Crossings: Stream crossing barriers such as paved roads, unpaved roads, railroads, trails and paths, fair-weather Arizona crossings, bridges, and box, pipe, or concrete culverts and baffles limit or impede salmonid migration. By providing fish friendly crossings where the crossing width is at least as wide as the active channel, a culvert pass is designed to withstand a 100-year storm flow, or a crossing bottom is buried below the streambed creates access to migratory and spawning habitat. Examples include but are not limited to replacement of barrier stream crossing with bridges, bottomless arch culverts, embedded culverts, or fords. See pages 28-30 in the BA (CDFW 2022) for a more detailed description.

HU – Watershed Restoration (Upslope): Upslope watershed restoration projects are designed to reduce sediment delivery to anadromous streams through road decommissioning, road upgrading, and storm proofing roads (replacing high risk culverts with bridges, installing culverts to withstand the 100-year flood flow, installing critical dips, installing armored crossings, and removing unstable sidecast and fill materials from steep slopes). See pages 30-31 in the BA (CDFW 2022) for a more detailed description.

HR – Riparian Habitat Restoration: Riparian restoration projects are designed to improve instream salmonid habitat through increased stream shading which lower stream temperatures, as well as increase future recruitment of woody debris to streams, and increase invertebrate forage productions. This project type typically includes the following: natural regeneration, livestock exclusionary fencing, bioengineering, revegetation projects, tree and natural material revetment, mulching, willow wall revetment, willow siltation baffles, brush mattresses, check-dams, brush check-dams, exclusionary fencing, waterbars and eradication of non-native, invasive vegetation species and revegetation with native endemic riparian species. See pages 31-34 in the BA (CDFW 2022) for a more detailed description.

WC – Water Conservation Measures: Eligible water conservation projects are those that provide more efficient use of water extracted from stream systems and result in an increase in flows that benefit aquatic species. Off-channel water storage, changes in the timing or source of water supply, moving points of diversion, irrigation ditch lining, piping, stock-water systems, installation of efficiency irrigation systems, graywater, and rainfall collection systems, and agricultural tailwater recovery/management systems are included in this category when the water savings are quantified and dedicated for instream beneficial flows. The water savings for these projects must include an instream dedication of 100% of the water saved due to project implementation and in a manner to support fish during water limited seasons, and shall dedicate to the stream for anadromous salmonid benefits through a mechanism such as a Forbearance Agreement, an Instream Flow Lease, or a formal dedication or transfer of water rights through Chapter 10, Section 1707 of the California Water Code (1707 petition). See pages 34-36 in the BA (CDFW 2022) for a more detailed description.

WD – Water Measuring Devices (Instream and Water Diversion): Eligible water measuring device projects are those that will install, test, and maintain instream water diversion measuring devices. The instream gauges must be installed so they do not impede fish passage in anadromous streams. See pages 36-37 in the BA (CDFW 2022) for a more detailed description.

PD – Project Design: Eligible proposals for developing project designs or a feasibility study for restoration activities are those that would protect or improve habitat for salmonids (e.g., the above list of project types). While these project types generally have no on-the-ground work, there is the potential need for small levels of ground disturbance for geotechnical surveys (i.e., ground water wells) in order to produce the most scientifically sound designs for future implementation projects. See page 37-38 in the BA (CDFW 2022) for a more detailed description.

MO – Monitoring Watershed Restoration (Large-scale and Project-scale): Eligible restoration monitoring projects are those which will address at least one of the following tasks: (1) implementation monitoring, (2) effectiveness monitoring and (3) validation monitoring. Such monitoring may include capture and handling of fish, and may result in minor increases in turbidity when monitors wade in the stream to measure habitat features. See page 38 in the BA (CDFW 2022) for a more detailed description.

SC – Fish Screens: This category includes the installation 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. Pile driving may be needed for certain types of screens. Typically, if the fish screen is placed within 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 screens must be consistent with NMFS fish screening guidelines. See pages 38-39 in the BA (CDFW 2022) for a more detailed description.

1.1.3. Construction Techniques

The CDFW Manual[2] provides information, guidance, and techniques for proper implementation of various types of salmonid restoration projects. Additional acceptable manuals allowed through the FRGP and the sections of those eligible for usage (in addition to the CDFW Manual) are described in Attachment C of the BA (CDFW 2022). Further, FRGP will conduct an annual meeting during the month of October each year to address potential changes/updates to these approved restoration manuals. This will allow all agencies to bring forth the most up-to-date scientific manuals for use in restoration methods for the benefit of listed species and habitats; as well as allowing for discussion on the possible change in effects that may follow from the inclusion of proposed additional manuals. CDFW will involve NMFS in this process.

1.1.4. Program-wide Best Management Practices (BMPs), Conservation Measures, and Mitigation & Avoidance Measures

Below is a partial list of BMPs and measures for projects implemented under RGP-12. These BMPs and measures are those most relevant to avoiding or minimizing adverse effects on

[2] http://www.dfg.ca.gov/fish/Resources/HabitatManual.asp

salmonids and their habitat. See pages 41-52 in the BA (CDFW 2022) for a complete list of the BMPs and measures that will be implemented with this Program.

- Project work within the wetted stream shall be limited to the period between June 15 and November 1, or the first significant rainfall, or whichever comes first. Actual projects start and end dates, within this timeframe, are at the discretion of the CDFW (i.e., on the Shasta River projects must be completed between July 1 and September 15 to avoid impacts to immigrating and emigrating salmonids).
- To account for the increased sediment production from projects and to limit impacts from large scale projects, CDFW will limit the amount of large-scale HI projects that are greater than or equal to 50 acres in size. Projects of these sizes will be limited to 1-2 per year per HUC-10 size (see section 4.1.4 of the BA (CDFW 2022) for HUC-10 size limits). As such no more than one small dam or project 50 acres or greater would be allowed per year at a HUC-10 watershed scale of 100 square miles or less. Conversely, no more than two small dam projects or projects that are 50 acres or greater would be allowed per year in HUC-10s that are 101 square miles or more. These limits only apply to the instream construction phase of the projects where the mobilization of sediment is most likely to occur and does not pertain to riparian activities or the life of the active grant project. In addition, all projects during their construction phase under this permit will be spaced at least 1,500 lineal feet apart in fish bearing streams and 500 lineal feet apart in non-fishing bearing streams to avoid compounding mobilization of sediment during construction activities.
- Fish relocation and dewatering activities shall only occur between June 15 and November 1 of each year and shall be performed by a qualified fisheries biologist.
- A maximum of 1,000 contiguous feet of that stream reach may be dewatered at any given time. Other sections of stream within the same project area may be dewatered in up to 1,000 contiguous foot increments, as long as listed fish that were handled during the initial dewatering event are not handled during subsequent dewatering events during the same year. To avoid handling the same fish multiple times during sequenced dewatering events, fish must be relocated to suitable habitat conditions outside of the zone that could be dewatered during that season. In addition, for each dewatering and relocation event, sufficient field staff must be available to efficiently move and care for relocated fish. The fish relocation plan submitted prior to the event must describe this sufficiency.
- Staging/storage areas for equipment, materials, fuels, lubricants, and solvents, will be located outside of the stream's high-water channel and associated riparian area where it cannot enter the stream channel. Stationary equipment such as motors, pumps, generators, compressors, and welders located within the dry portion of the stream channel or adjacent to the stream, will be positioned over drip-pans. Vehicles will be moved out of the normal high-water area of the stream prior to refueling and lubricating. Prior to the onset of work, CDFW shall ensure that the grantee has prepared a plan to allow a prompt and effective response to any accidental spills.
- The number of access routes and footpaths, number and size of staging areas, and the total area of the work site activity shall be limited to the minimum necessary. All access routes, footpaths, and staging areas created during the project shall be replanted with native vegetation.

- Any construction debris shall be prevented from falling into the stream channel. Any material that does fall into a stream during construction shall be immediately removed in a manner that has minimal impact to the streambed and water quality.
- Where feasible, the construction shall occur from the bank, or on a temporary pad underlain with filter fabric.
- Temporary fill shall be removed in its entirety prior to close of work-windows.
- Suitable large woody debris removed from fish passage barriers that is not used for habitat enhancement, shall be left within the riparian zone so as to provide a source for future recruitment of wood into the stream, reduce surface erosion, contribute to amounts of organic debris in the soil, encourage fungi, provide immediate cover for small terrestrial species and to speed recovery of native vegetation.

Dewatering and Fish Relocation

- CDFW shall minimize the amount of wetted stream channel that is dewatered at each individual project site to the fullest extent possible.
- Any work within the stream channel shall be performed in isolation from the flowing stream and erosion protection measures shall be in place before work begins.
- If there is any flow when work will be done, the grantee shall construct coffer dams upstream and downstream of the excavation site and divert all flow from upstream of the upstream dam to downstream of the downstream dam.
- No heavy equipment shall operate in the live stream, except as may be necessary to construct coffer dams to divert stream flow and isolate the work site.
- Coffer dams may be constructed with clean river run gravel or sandbags and may be sealed with sheet plastic. Upon project completion, sandbags and any sheet plastic shall be removed from the stream. Clean river run gravel may be left in the stream channel, provided it does not impede stream flow or fish passage and conforms to natural channel morphology without significant disturbance to natural substrate.
- Dewatering shall be coordinated with a qualified biologist to perform fish and wildlife relocation activities.
- The length of the dewatered stream channel shall be kept to a minimum and shall be less than 1,000 contiguous feet at any given site on any given day.
- Pump intakes shall be covered with 0.125-inch mesh to prevent entrainment of fish or amphibians that failed to be removed. Pump intakes shall be periodically checked for impingement of fish or amphibians and shall be relocated according to the approved measured outline for each species below.
- Prior to placement of block nets above and below the work area, qualified biologists will visually scan the area, watching closely for large salmonids or evidence of their presence (e.g., disturbance of water surface due to top of dorsal fin). During net placement, biologists will watch closely to ensure that no adults are inadvertently captured. If any adults are captured, work will cease and NMFS will be contacted. Sampling will not proceed without NMFS' express approval.
- Species shall be excluded from the work area by blocking the stream channel above and below the work area with fine-meshed net or screen. Mesh shall be no greater than 1/8-inch diameter. The bottom edge of the net or screen shall be completely secured to the channel bed to prevent fish from reentering the work area. Exclusion screening shall be placed in areas of low water velocity to minimize fish impingement. Screens shall be

regularly checked and cleaned of debris to permit free flow of water. While placing block nets, implementers will watch closely to ensure that no adults are inadvertently trapped between the nets. If any adults are captured, work will cease and NMFS will be contacted. In-water work will not proceed without NMFS' express approval.

- Any equipment entering the active stream (for example, in the process of installing a cofferdam) shall be preceded by an individual on foot to displace wildlife and prevent them from being crushed.
- Handling and electrofishing of NMFS jurisdictional aquatic species under this Program may only be done by biologists that CDFW has approved as qualified. Qualified biologists must be experienced in identifying NMFS jurisdictional aquatic species, have experience with removal and relocation of these species, and have an understanding of the habitat and/or water quality needs of these species.
- Any project looking to conduct electrofishing within brackish waters will need to submit a plan to FRGP for approval by NMFS before work may commence. This plan must also show that the individual project will be using the correct specialized rods and attachments for work in high conductivity waters.
- In regions of California with high summer air temperatures, perform relocation activities either during morning periods or earlier in the season when temperatures are low.
- Prior to capturing fish, the most appropriate release location(s) shall be determined. The following shall be determined:
    - Temperature: Water temperature shall be similar as the capture location.
    - Habitat: There shall be ample habitat for the captured fish (i.e., the release location(s) are not already overcrowded with fish either naturally or from relocation efforts).
    - Exclusion from work site: There shall be a low likelihood for the fish to reenter the work site or become impinged on exclusion net or screen.
- Handling of salmonids shall be minimized. However, when handling is necessary, always wet hands or nets prior to touching fish.
- Temporarily hold fish in cool, shaded, aerated water in a container with a lid. Provide aeration with a battery-powered external bubbler. Protect fish from jostling and noise and do not remove fish from this container until time of release.
- Air and water temperatures shall be measured periodically. A thermometer shall be placed in holding containers and, if necessary, periodically conduct partial water changes to maintain a stable water temperature. If water temperature reaches or exceeds 18°C, fish shall be released, and rescue operations ceased.
- Overcrowding in containers shall be avoided by having at least two containers and segregating young-of-year (YOY) fish from larger age-classes to avoid predation. Larger amphibians, such as Pacific giant salamanders, shall be placed in the container with larger fish. If fish are abundant, the capturing of fish and amphibians shall cease periodically and captured fish and amphibians shall be released at the predetermined locations.
- If mortality during relocation exceeds 3%, capturing efforts shall be stopped and the appropriate agencies shall be contacted immediately.

In-water Pile Driving

Most pile driving will be conducted in, or adjacent to, dry channels. If pile driving cannot occur in a dry channel, species will be removed using the techniques described within this section and project applicants shall implement the following measures to avoid and minimize potential adverse effects that could otherwise result from in-water pile driving activities:

- Project applicants shall conduct an hydroacoustic assessment and develop a pile driving plan to confirm that underwater sound pressure levels are expected to below the accumulative sound exposure level (cSEL) injury threshold criteria for peak pressure and accumulated sound exposure levels. The pile driving plan will identify the appropriate, site-specific attenuation, sound monitoring, dewatering, or fish relocation measures necessary to avoid injury and mortality. If water depths allow for hydrophones that will enable real-time monitoring of underwater sound pressure levels, pile driving will cease before injury levels are exceeded regardless of what kind of attenuation, dewatering, or fish relocation measures are implemented. Impact pile driving that exceeds the Interim Pile Driving Criteria (FHWG 2008) listed below (or current Pile Driving Criteria when 2008 criteria are updated) will not be eligible for programmatic permitting.

    - Peak pressure = 206 decibel (dB) peak
    - Accumulated sound exposure levels = 183 dB cSEL
    - Accumulated sound exposure levels for fish over 2 grams = 187 dB cSEL

- The 183 dB cSEL level will be used unless, through the variance process defined below, salmonids under 2 grams are determined to be absent. The number of piles, type/size of the piles, estimated sound levels caused by the driving, how many piles will be driven each day, and any other relevant details on the nature of the pile driving activity must be included in the project application. See the Technical Guidance for the Assessment of Hydroacoustic Effects of Pile Driving on Fish (Caltrans 2020) for more information. Proposed projects that include impact pile driving that would exceed the183 dB cSEL level identified in the June 2008 Interim Pile Driving Criteria (FHWG 2008) (or exceeds the current Pile Driving Criteria when 2008 criteria are updated) would not be eligible for programmatic permitting and would require separate authorization and section 7 consultation.
- Pile driving shall occur during the established/approved in-water and general work windows described above.
- Sheet piling shall be driven by vibratory or nonimpact methods (i.e., hydraulic) that result in sound pressures below threshold levels to the extent feasible.
- Pile driving activities shall occur during periods of reduced currents. Pile-driving activities shall be monitored to ensure that the effects of pile driving on protected species are minimized. If any stranding, injury, or mortality to listed species is observed, NMFS/USFWS shall be immediately notified, and in-water pile driving shall cease. Vibratory hammers, rather than impact hammers, shall be used whenever possible.
- If pile driving is implemented in, or adjacent to, a wetted stream, monitoring of listed species shall occur during pile-driving activity to ensure no species stranding or mortality occurs.

- Sound monitoring will be done, if monitoring is possible due to water depth, to ensure to cSEL injury levels are not exceeded. If levels are met, then pile driving shall cease for a minimum of 12 hours. Potential attenuation measures include the following:

  - Use of a cushioning block between the hammer and pile.
  - Use of a confined or unconfined air bubble curtain.

Herbicide use protection measures
The following protection measures may be relevant to projects where herbicide application is anticipated as a project activity. Herbicides with the following active ingredients are approved by this Program for use in the riparian zone: 2,4-D (amine), Aminopyralid, Chlorsulfuron, Dicamba, Glyphosphate 1 (aquatic), Glyphosphate 2, Picloram and Tricliopyr.

- Whenever feasible, reduce vegetation biomass by mowing, cutting, or grubbing it before applying herbicide to reduce the amount of herbicide needed.
- Chemical control of invasive plants and animals will only be used when other methods are determined to be ineffective or infeasible. Herbicide use will be evaluated on a project-by-project basis with consideration of (and preference given toward) integrated pest management (IPM) strategies wherever possible. See University of California statewide IPM Program for guidance documents.
- Chemical use is restricted in accordance with approved application methods and BMPs designed to prevent exposure to non-target areas and organisms.
- Any chemical considered for control of invasive species must adhere to all regulations, be approved for use in California, its application must adhere to all regulations per the California Environmental Protection Agency, and it must be applied by a licensed applicator under all necessary state and local permits.
- Use herbicides 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 a lower rate is needed to reduce non-target impacts.
- Treat only the minimum area necessary for effective control. Soil-activated herbicides can be applied as long as directions on the label are followed. FRGP staff will recommend project proponents seek the advice of an Agricultural Pest Control Advisor if they are unfamiliar with the best chemical choices and combinations for their project, even if they are only planning to use the choices put forward in this biological assessment. If the project proponent is experienced with the use of certain chemicals and chemical mixtures, this extra step may not be necessary.
- 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.
- The licensed pesticide applicator will keep a record of all plants/areas treated, amounts and types of herbicides used, and dates of application, and pesticide application reports must be completed within 24 hours of application and submitted to applicable agencies for review. Wind and other weather data will be monitored and reported for all pesticide application reports.

1.1.5. Project Monitoring

The Program requires implementers of some project types to monitor their projects, and this monitoring may involve fish capture. Implementers of the project type “Monitoring Watershed Restoration (MO)” may also encounter and capture fish. In addition, a portion of the projects funded through FRGP are monitored by CDFW’s Monitoring and Evaluation of Salmonid Habitat Restoration (MESHR) team, which includes staff from CDFW and the Pacific States Marine Fisheries Commission. Each year, the MESHR Team assesses the effectiveness of at least 10% of the FRGP projects funded that year and selects these projects by conducting a random draw from all of the year’s funded restoration projects. The MESHR Team also monitors the implementation of 100% of the on-the-ground projects funded annually.

1.1.5.1 MESHR

1.1.5.1.1 Pre-Project and Post-Construction Monitoring

Before on-the-ground implementation of a project begins, the MESHR team conducts pre-treatment assessments on project work sites using checklists specific to each project type to create a baseline of the habitat prior to construction of project features. One to three years after a project’s completion, the MESHR team will return to a project site(s) to then perform a post-treatment assessment, again using project type specific checklists which are designed to evaluate changes occurring from pre-treatment and project completion. These objectives are aimed at determining both 1) soundness and performance of project features after one to three winters, and 2) effectiveness based on any observed changes to habitat qualities. Additionally, projects that are for remediation of complete fish passage barriers and instream habitat improvement are monitored for use by salmonids via winter spawner surveys and/or summer snorkel surveys.

1.1.5.1.2 Pre-Assessment Monitoring and Post Project Effectiveness Monitoring

When planning restoration projects, a lack of information regarding species occurrence, distribution, and density during different parts of the year often confound project design objectives. Knowing site-specific fish and other listed species presence/absence information during the summer and winter can help inform design elements and help determine if the proposed feature(s) will be used only for winter rearing, summer rearing, or both.

In order to determine the effectiveness of a project, CDFW will species utilization, timing, and duration of use, and in certain cases, growth rates of target species utilizing the project area. Passive Integrated Transponder (PIT) tags may be used to determine growth rates, residency times, and apparent survival. Tissue samples may be provided to the various CDFW laboratories and research centers and NOAA's Southwest Fisheries Science Center for genetic analysis when requested by either.

Some of the projects that may be monitored for effectiveness include estuary restoration, Beaver Dam Analogs (BDAs) off-channel habitat creation, and floodplain reconnection. Many projects will be monitored for both summer and winter habitat utilization. Monitoring efforts may be conducted from the first significant rainfall (October – November) through spring (April – June) for winter rearing projects and also during summer base flow season (June – October) to determine summer rearing. In addition to the biological monitoring, habitat conditions (temp/salinity/dissolved oxygen (DO)) may be spot checked during sampling events as well.

The types of salmonid sampling that may be used in effectiveness monitoring are: snorkel surveys, seining, minnow traps, fyke nets, electrofishing, and rotary screw traps. Salmonids may be handled, trapped, captured, anesthetized, weighed/measured, PIT tagged, and sampled for tissue before released. See pages 73-77 of section 2.9 in the BA (CDFW 2022) for further information.

This document analyzes the effects of capturing juvenile salmonids during monitoring activities. Measures will be taken to prevent inadvertent capture of adult salmonids. Prior to deployment of gear to capture juvenile salmonids, monitors will visually scan the area to detect the presence of any adult salmonids. Monitors will also look for indirect evidence of adult fish (e.g., disturbance of water surface by dorsal fin). While sampling, monitors will continue to watch closely to ensure that no previously undetected adults are inadvertently captured. If any adults are captured, work will cease and NMFS will be contacted. Sampling will not proceed without NMFS' express approval.

1.1.5.2 Capture Methods

Many project types including, but not limited to estuary restoration, BDAs, off-channel habitat creation and floodplain reconnection projects may be monitored by CDFW or project implementers to estimate the effectiveness of these efforts. Many of these projects will be monitored for both summer and winter habitat utilization. Monitoring efforts may be conducted from the first significant rainfall (October – November) through spring (April – June) for winter rearing projects and also during summer base flow season (June – October) to determine summer rearing. In addition to the biological monitoring, habitat conditions (temp/salinity/DO) may be spot checked during sampling events as well.

Snorkel Surveys
Snorkel surveys are conducted to determine if a species is present in a given area. Surveys may be conducted pre- and post-project when conditions allow. Survey crews would consist of 1-2 divers counting salmonids swimming upstream using a 4-pass bounded count methodology for population estimates or single pass surveys for presence/absence surveys in water that has at least 3 feet of visibility. Procedure used: Observation only.

Seining
Seining is conducted to capture species in deeper water that does not have significant complexity (e.g., where there is no large wood). Two consecutive seine hauls are conducted at a given location using a 30ft x 4ft knotless mesh nylon seine. Nets consist of 6mm mesh wing sections 9m in length and a 3mm mesh 2m x 2m bag section. The seine is set by 2-3 crew members in a round haul fashion by fixing one end on the bank while the other end is deployed, wading upstream and returning to shore in a half circle. Once the lead line approaches the shore it is withdrawn more than the cork line until species are corralled in the bag and the lead line is on the bank. Each haul is expected to take approximately 1 – 5 minutes. Species captured in the bag are kept submerged in water until they are transferred by dip net, separated, and placed in aerated 5-gallon buckets following each haul prior to processing. Sampling will cease if water quality conditions are unfavorable to the health of the species or if temperatures exceed 21°C. Procedures used: seine, measure, weigh, anesthetize, PIT tag, capture, handle, release.

Minnow Traps
Minnow trapping is typically used in very complex habitats where seining would be likely not to be successful due to small/large wood and significant aquatic vegetation. Galvanized 5mm square wire mesh minnow traps will be baited with iodine-soaked roe and set. The minnow traps are 430mm in length with a middle circumference of 760 mm and fyke openings of 25mm at both ends. Traps are fished at each site on the bottom of the channel next to habitat structures if possible. Soak time of individual traps ranges from 30 to 180 minutes. Sampling will cease if water quality conditions are unfavorable to the health of the fishes or if temperatures exceed 21°C. Procedures used: trap, measure, weigh, anesthetize, PIT tag, capture, handle, release.

Fyke Nets
Fyke nets will be used in off-channel and slow-water habitats when minnow traps and seining are ineffective. Fyke nets (size ¼ in. mesh) may be set in the afternoon in a pond with the entrance/exit blocked so that no species may enter or leave. Fyke nets are set overnight and checked the following morning. The same methods will be repeated approximately one or two days following the first trapping event. Fyke nets have an opening at the mouth up to 15-feet wide and narrow down to a small opening approximately 6-inches wide and up to 20-feet in length. Fyke nets are set in the deepest part of the pond and would not be used in flood flows or when temperatures exceed 21°C. Procedures used: trap, measure, weigh, anesthetize, PIT tag, capture, handle, release.

Electrofishing
Electrofishing may be used in low water conditions when stream habitat is too complex for seining or minnow traps, or if other methods are not effective to inform the monitoring question. All electrofishing will be conducting according to NMFS Guidelines for Electrofishing Waters Containing Salmonids listed under the Endangered Species Act (2000) and the documents provided by the Pacific Lamprey Conservation Initiative found in the biological assessment's section 2.8.3. Electrofishing activities will be conducted during periods of the day and ideally when water is coolest. All electrofishing and handling procedures will be consistent with electrofishing methods and guidelines described above which describes species relocation activities, except species would not be relocated from the habitat where they were found during effectiveness monitoring. After handling, species will be released in the same general location they were captured. Electrofishing will not be used in high flows or when temperatures exceed 18°C. Additionally, any project looking to conduct electrofishing within brackish waters will need to submit a plan to FRGP for approval by NMFS and USFWS before work may commence. This plan must also show that the individual project will be using the correct specialized rods and attachments for work in high conductivity waters. Procedures used: electrofishing, measure, weigh, anesthetize, PIT tag, capture, handle, release.

Rotary Screw Traps
Rotary screw traps can be used to estimate juvenile production and with other methods like PIT tagging to describe individual fish growth, movement, survival, and residence timing which can used to evaluate restoration effectiveness. Rotary screw traps consist of large cones suspended between two floating pontoons. River flow rotates the cone and funnels a portion of the migrating fish into an underwater holding tank at the back of the trap. Rotary screw traps will only be operated when flows are safe for personnel to access and operate traps and avoid equipment damage. Traps will be checked daily, and all species will be removed from the live well. Salmonids can be anesthetized, measured, weighed, scanned for PIT tags, and examined for any fin-clips. Rotary screw trap efficiency can be estimated by releasing salmonids upstream of the trap after tagging and recovery. Efficiencies for juvenile salmonids will be estimated from this mark-recapture data using standard techniques where marked fish are released upstream of the trap, and the portion of these fish subsequently recaptured at the traps and will serve as the basis for calculating trap efficiencies. Procedures used: rotary screw traps, measure, weigh, anesthetize, PIT tag, capture, handle, and release.

1.1.5.3 Handling Methods

Anesthetic
Fish will be closely observed in an anesthetic bath of Alka-Seltzer Gold (aspirin free) brand sodium bicarbonate (NaHCO3) until loss of equilibrium is achieved but operculum movement is still present. Concentrations will range from one to two tablets per gallon of fresh river water depending on fish size and water temperature. The bicarbonate material will be allowed to completely dissolve before fish are added to the anesthetic bath.

Fry and juveniles will be anesthetized in groups < 10 fish per batch and larger parr and smolts will be anesthetized in groups of two fish. Fish should be able to be handled after 1-2 minutes in the anesthetic bath and will be processed immediately following loss of equilibrium. Fish will be allowed to recover in 5-gallon buckets of aerated fresh river water until normal behavior is observed. Water temperature in the recovery bucket will be monitored and maintained to be within two degrees of the ambient river temperature. Fish will be released to slow water habitat in the location in which they were originally found.

Measure/Weigh

While anesthetized, individuals will be placed onto a wetted Plexiglas measuring board and measured to the nearest mm fork length (FL), then transferred to a wetted container on an electronic scale and weighed to the nearest 0.01g.

PIT Tagging

Anesthetized fish greater than or equal to 70 mm FL may be implanted with tags up to 12 mm long, fish 60 mm FL to 69 mm FL may be implanted with up to 9 mm tags, and fish <60 mm would not be tagged. A full duplex PIT tag that is surgically implanted into the body cavity of the fish will be used as described by Prentice et al. (1990). A small incision will be made with a sterile scalpel anterior to the pectoral fin and the tag would be inserted by hand into the body cavity of the fish. Recovery protocols would follow as above to allow for full recovery before release.

Tissue Sampling

Tissue sampling techniques such as fin-clipping are common to many scientific research efforts using listed species. Fin-clipping is the process of removing part of a fish's fin to either mark the fish or to collect genetic material for analysis. Although researchers have used all fins for marking at one time or another, the current preference is to clip the adipose, pelvic, or pectoral fins. Marks can also be made by punching holes or cutting notches in fins, severing individual fin rays (Welch and Mills 1981). Many studies have examined the effects of fin-clips on fish growth, survival, and behavior. The results of these studies are somewhat varied; however, it can be said that fin-clips do not generally alter fish growth.

1.1.5.4 Measures to Minimize Effects of Project Monitoring Activities

Snorkel surveys would be the predominant method of assessing species presence, wherever feasible. Where there is an interest in collecting growth data or to implant PIT tags to track movement and survival of species, fyke, seining, and minnow trapping efforts would be considered. If species handling is desired, data collection crews will be large enough to reduce the impact of handling on captured species to the greatest extent possible. Captured species will be placed in buckets of fresh river water with thermometers to verify temperature is consistent with environmental temperatures and a portable aerator to keep DO levels up to acceptable levels. During high flows, minnow traps will be set in areas of slow water refugia. All PIT tagged fish will be anesthetized before PIT tag implementation. All individuals will be returned to the habitat where they were collected. Further, FRGP is proposing a yearly meeting during the month of October each year (only if needed) to address potential changes/updates to these monitoring activities. This will allow all agencies to bring forth the most up-to-date scientific techniques for use in our restoration projects for the benefit of our listed species and habitats; as well as allowing for the discussion on the possible change in effects that may follow from the inclusion of new proposed monitoring techniques.

1.1.5.5 Annual Estimates of Fish Captured, Handled, and Tagged During Monitoring, and Related Fish Losses

Table 1: Annual exposure estimates of juvenile salmonids captured, handled, and tagged during project monitoring, and anticipated injury mortality response.

ESU/DPS	Maximum Number of Juveniles Captured and Handled	Maximum Number of Juveniles PIT tagged	Anticipated injury and mortality (3%)
SONCC coho salmon	2500	25	75
CCC coho salmon	500	50	15
CC Chinook salmon	30	10	1
NC steelhead	9000	900	270
CCC steelhead	1000	100	30
S-CCC steelhead	1000	100	30

We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not.

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

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

The Corps determined the proposed action is not likely to adversely affect Southern DPS Green Sturgeon (*Acipenser medirostris*), Southern Eulachon (*Thaleichthys pacificus*), or designated critical habitat for either species. Our concurrence is documented in the "Not Likely to Adversely Affect" Determinations section (2.10).

2.1 Analytical Approach

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

This biological opinion also relies on the regulatory definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02).

The designation of critical habitat for SONCC coho salmon, CCC coho salmon, CC Chinook salmon, NC steelhead, CCC steelhead, and S-CCC steelhead use the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The ESA Section 7 implementing regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the final rule revising the definition and adding this term (84 FR 44976, 44977; August 27, 2019), that revision does not change the scope of our analysis, and in this Opinion, we use the terms "effects" and "consequences" interchangeably.

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

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their critical habitat using an exposure–response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly 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; or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that is likely to be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' "reproduction, numbers, or distribution" for the jeopardy analysis. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the function of the PBFs that are essential for the conservation of the species. This biological opinion analyzes the effects of the proposed action on the following listed species and their designated critical habitats:

Threatened SONCC coho salmon
- Listing determination (70 FR 37160; June 28, 2005)
- Critical habitat designation (64 FR 24049; May 5, 1999)

Endangered CCC coho salmon
- Listing determination (70 FR 37160; June 28, 2005)
- Critical habitat designation (64 FR 24049; May 5, 1999)

Threatened CC Chinook salmon
- Listing determination (70 FR 37160; June 28, 2005)
- Critical habitat designation (70 FR 52488; September 2, 2005)

Threatened NC steelhead
- Listing determination (71 FR 834; January 5, 2006)
- Critical habitat designation (70 FR 52488; September 2, 2005)

Threatened CCC steelhead
- Listing determination (71 FR 834; January 5, 2006)
- Critical habitat designation (70 FR 52488; September 2, 2005)

Threatened S-CCC steelhead
- Listing determination (62 FR 43937; August 18, 1997)
- Critical habitat designation (70 FR 52488; September 2, 2005).

2.2.1 Species Description and Life History

2.2.1.1 Coho Salmon

The life history of coho salmon in California has been well documented by Shapovalov and Taft (1954) and Hassler (1987). In contrast to the life history patterns of other anadromous salmonids, coho salmon in California generally exhibit a relatively simple three-year life cycle. Adult coho salmon typically begin the freshwater migration from the ocean to their natal streams after heavy late fall or winter rains breach the sandbars at the mouths of coastal streams (Sandercock 1991). Delays in river entry of over a month are not unusual (Salo and Bayliff 1958, Eames et al. 1981). Migration continues into March, generally peaking in December and January, with spawning occurring shortly after arrival to the spawning ground (Shapovalov and Taft 1954).

Coho salmon are typically associated with medium to small coastal streams characterized by heavily forested watersheds; perennially-flowing reaches of cool, high-quality water; dense riparian canopy; deep pools with abundant overhead cover; instream cover consisting of large, stable woody debris and undercut banks; and gravel or cobble substrates.

Female coho salmon choose spawning areas usually near the head of a riffle, just below a pool, where water changes from a laminar to a turbulent flow and small to medium gravel substrate are present. The flow characteristics surrounding the redd usually ensure good aeration of eggs and embryos, and flushing of waste products. The water circulation in these areas also facilitates fry emergence from the gravel. Preferred spawning grounds have: nearby overhead and submerged cover for holding adults; water depth of 4 to 21 inches; water velocities of 8 to 30 inches per second; clean, loosely compacted gravel (0.5 to 5-inch diameter) with less than 20 percent fine silt or sand content; cool water ranging from 39 to 50 degrees Fahrenheit (° F) with high dissolved oxygen of 8 mg/L; and inter-gravel flow sufficient to aerate the eggs. Lack of suitable gravel often limits successful spawning.

Each female builds a series of redds, moving upstream as she does so, and deposits a few hundred eggs in each. Fecundity of female coho salmon is directly proportional to size; each adult female coho salmon may deposit from 1,000 to 7,600 eggs (Sandercock 1991). Briggs (1953) noted a dominant male accompanies a female during spawning, but one or more subordinate males may also engage in spawning. Coho salmon may spawn in more than one redd and with more than one partner (Sandercock 1991). Coho salmon are semelparous meaning they die after spawning. The female may guard a redd for up to two weeks (Briggs 1953).

The eggs generally hatch after four to eight weeks, depending on water temperature. Survival and development rates depend on temperature and dissolved oxygen levels within the redd. According to Baker and Reynolds (1986), under optimum conditions, mortality during this period can be as low as 10 percent; under adverse conditions of high scouring flows or heavy siltation, mortality may be close to 100 percent. McMahon (1983) found that egg and fry survival drops sharply when fine sediment makes up 15 percent or more of the substrate. The newly-hatched fry remain in the redd from two to seven weeks before emerging from the gravel (Shapovalov and Taft 1954). Upon emergence, fry seek out shallow water, usually along stream margins. As they grow, juvenile coho salmon often occupy habitat at the heads of pools, which generally provide an optimum mix of high food availability and good cover with low swimming cost (Nielsen 1992). Chapman and Bjornn (1969) determined that larger parr tend to occupy the head of pools, with smaller parr found further down the pools. As the fish continue to grow, they move into deeper water and expand their territories until, by July and August; they reside exclusively in deep pool habitat. Juvenile coho salmon prefer: well shaded pools at least 3.3 feet deep with dense overhead cover, abundant submerged cover (undercut banks, logs, roots, and other woody debris); water temperatures of 54° to 59° F (Brett 1952, Reiser and Bjornn 1979), but not exceeding 73° to 77° F (Brungs and Jones 1977) for extended time periods; dissolved oxygen levels of 4 to 9 mg/L; and water velocities of 3.5 to 9.5 inches per second in pools and 12 to 18 inches per second in riffles. Water temperatures for good survival and growth of juvenile coho salmon range from 50° to 59° F (Bell 1973, McMahon 1983). Growth is slowed considerably at 64° F and ceases at 68° F (Bell 1973).

Preferred rearing habitat has little or no turbidity and high-sustained invertebrate forage production. Juvenile coho salmon feed primarily on drifting terrestrial insects, much of which are produced in the riparian canopy, and on aquatic invertebrates growing within the interstices of the substrate and in leaf litter in pools. As water temperatures decrease in the fall and winter months, fish stop or reduce feeding due to lack of food or in response to the colder water, and growth rates slow. During December through February, winter rains result in increased stream flows. By March, following peak flows, fish resume feeding on insects and crustaceans, and grow rapidly.

In the spring, as yearlings, juvenile coho salmon undergo a physiological process, or smoltification, which prepares them for living in the marine environment. They begin to migrate downstream to the ocean during late March and early April, and out-migration usually peaks in mid-May, if conditions are favorable. Emigration timing is correlated with peak upwelling currents along the coast. Entry into the ocean at this time facilitates more growth and, therefore, greater marine survival (Holtby et al. 1990). At this point, the smolts are about four to five inches in length. After entering the ocean, the immature salmon initially remain in nearshore waters close to their parent stream. They gradually move northward, staying over the continental shelf (Brown et al. 1994). Although they can range widely in the north Pacific, movements of coho salmon from California are poorly understood.

2.2.1.2 Chinook salmon

Chinook salmon return to freshwater to spawn when they are three to eight years old (Healey 1991). Some Chinook salmon return from the ocean to spawn one or more years before they reach full adult size, and are referred to as jacks (males) and jills (females). Chinook salmon runs are designated on the basis of adult migration timing; however, distinct runs also differ in the degree of maturation at the time of river entry, thermal regime and flow characteristics of their spawning site, and actual time of spawning (Myers et al. 1998). Both winter-run and spring-run Chinook salmon tend to enter freshwater as immature fish, migrate far upriver, and delay spawning for weeks or months. For comparison, fall-run Chinook salmon enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of rivers, and spawn within a few days or weeks of freshwater entry (Healey 1991).

Fall-run CC Chinook salmon migrate upstream from September through November, with most migration occurring in September and October following early-season rain storms. Spawning largely occurs from early October through December, with a peak in late October. Adequate instream flows and cool water temperatures are more critical for the survival of spring-run Chinook salmon (compared to fall-run or winter-run Chinook salmon) due to over-summering by adults and/or juveniles. Chinook salmon generally spawn in gravel beds that are located at the tails of holding pools (Bjornn and Reiser 1991). Adult female Chinook salmon prepare redds in stream areas with suitable gravel composition, water depth, and velocity. Optimal spawning temperatures range between 42° to 57° F. Redds vary widely in size and location within the river. Preferred spawning substrate is clean, loose gravel, mostly sized between 1 and 10 centimeters (cm), with no more than 5% fine sediment. Gravels are unsuitable when they have been cemented with clay or fine particles or when sediments settle out onto redds, reducing inter-gravel percolation (62 FR 24588). Minimum inter-gravel percolation rate depends on flow rate, water depth, and water quality. The percolation rate must be adequate to maintain oxygen delivery to the eggs and remove metabolic wastes. Chinook salmon require a strong, constant level of subsurface flow, as a result, suitable spawning habitat is more limited in most rivers than superficial observation would suggest. After depositing eggs in redds, most adult Chinook salmon guard the redd from 4 to 25 days before dying.

Chinook salmon eggs incubate for 90 to 150 days, depending on water temperature. Successful incubation depends on several factors including dissolved oxygen levels, temperature, substrate size, amount of fine sediment, and water velocity. Maximum survival of incubating eggs and pre-emergent fry occurs at water temperatures between 42° and 56° F with a preferred temperature of 52° F. CC Chinook salmon fry emerge from redds during December through mid-April (Leidy and Leidy 1984).

After emergence, Chinook salmon fry seek out areas behind fallen trees, back eddies, undercut banks, and other areas of bank cover (Everest and Chapman 1972). As they grow larger, their habitat preferences change. Juveniles move away from stream margins and begin to use deeper water areas with slightly faster water velocities, but continue to use available cover to minimize predation risk and reduce energy expenditure. Fish size appears to be positively correlated with water velocity and depth (Chapman and Bjornn 1969, Everest and Chapman 1972). Optimal temperatures for both Chinook salmon fry and fingerlings range from 54° to 57° F, with maximum growth rates at 55° F (Boles 1988). Chinook salmon feed on small terrestrial and aquatic insects and aquatic crustaceans. Cover, in the form of rocks, submerged aquatic vegetation, logs, riparian vegetation, and undercut banks provide food, shade, and protect juveniles from predation. CC Chinook salmon will rear in freshwater for a few months and out-migrate during April through July (Myers et al. 1998).

2.2.1.3 Steelhead

Steelhead are anadromous forms of *O. mykiss*, spending some time in both freshwater and saltwater. Steelhead young usually rear in freshwater for one to three years before migrating to the ocean as smolts, but rearing periods of up to seven years have been reported. Migration to the ocean usually occurs in the spring. Steelhead may remain in the ocean for one to five years (two to three years is most common) before returning to their natal streams to spawn (Busby et al. 1996). The distribution of steelhead in the ocean is not well known. Coded wire tag recoveries indicate that most steelhead tend to migrate north and south along the continental shelf (Barnhart 1986).

Steelhead can be divided into two reproductive ecotypes, based upon their state of sexual maturity at the time of river entry and the duration of their spawning migration: stream maturing and ocean maturing. Stream maturing steelhead enter fresh water in a sexually immature condition and require several months to mature and spawn, whereas ocean maturing steelhead enter fresh water with well-developed gonads and spawn shortly after river entry. These two reproductive ecotypes are more commonly referred to by their season of freshwater entry (i.e., summer [stream maturing] and winter [ocean maturing] steelhead). The timing of upstream migration of winter steelhead, the ecotype most likely encountered during the proposed action, is typically correlated with higher flow events occurring from late October through May. In central and southern California, significant river outflow is also often required to breach sandbars that block access from the ocean; for this reason, upstream steelhead migration in these areas can be significantly delayed, or precluded entirely during extremely dry periods.

Adult summer steelhead migrate upstream from March through September; however, results from past capture/relocation efforts in the action area (CDFW 2014, 2015, 2016, 2017, 2018, 2019) suggest the chance of encountering adult summer steelhead during the Program's "work window" is extremely low and thus unlikely to occur. In contrast to other species of Oncorhynchus, steelhead may spawn more than one season before dying (iteroparity); although one-time spawners represent the majority.

Because rearing juvenile steelhead reside in freshwater all year, adequate flow and temperature are important to the population at all times (CDFG 1997). Outmigration appears to be more closely associated with size than age. In Waddell Creek, Shapovalov and Taft (1954) found steelhead juveniles migrating downstream at all times of the year, with the largest numbers of young-of-year and age 1+ steelhead moving downstream during spring and summer. Smolts can range from 5.5 to 8 inches in length. Steelhead outmigration timing is similar to coho salmon (NMFS 2016f).

Survival to emergence of steelhead embryos is inversely related to the proportion of fine sediment in the spawning gravels. However, steelhead are slightly more tolerant than other salmonids, with significantly reduced survival when fine materials of less than 0.25 inches in diameter comprise 20 to 25 percent of the substrate. Fry typically emerge from the gravel two to three weeks after hatching (Barnhart 1986).

Upon emerging from the gravel, fry rear in edge-water habitats and move gradually into pools and riffles as they grow larger. Older fry establish territories which they defend. Cover is an important habitat component for juvenile steelhead, both as a velocity refuge and as a means of avoiding predation (Meehan and Bjornn 1991). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. In winter, juvenile steelhead become less active and hide in available cover, including gravel or woody debris.

Water temperature can influence the metabolic rate, distribution, abundance, and swimming ability of rearing juvenile steelhead (Barnhart 1986, Bjornn and Reiser 1991, Myrick and Cech 2005). Optimal temperatures for steelhead growth range between 50° and 68° F (Hokanson et al. 1977, Wurtsbaugh and Davis 1977, Myrick and Cech 2005). Variability in the diurnal water temperature range is also important for the survivability and growth of salmonids (Busby et al. 1996).

Suspended sediment concentrations, or turbidity, also can influence the distribution and growth of steelhead (Bell 1973, Sigler et al. 1984, Newcombe and Jensen 1996). Bell (1973) found suspended sediment loads of less than 25 milligrams per liter (mg/L) were typically suitable for rearing juvenile steelhead.

2.2.2 Species Status

2.2.2.1 SONCC coho salmon

Although long-term data on coho salmon abundance are scarce, the available evidence from short-term research and monitoring efforts indicate that spawner abundance has declined since the last status review for populations in this ESU (Williams et al. 2016). In fact, most of the 30 independent populations in the ESU are at high risk of extinction because they are below or likely below their depensation threshold, which can be thought of as the minimum number of adults needed for survival of a population.

The distribution of SONCC coho salmon within the ESU is reduced and fragmented, as evidenced by an increasing number of previously occupied streams from which SONCC coho salmon are now absent (Good et al. 2005, Williams et al. 2011, and Williams et al. 2016). Extant populations can still be found in all major river basins within the ESU (70 FR 37160). However, extirpations, loss of brood years, and sharp declines in abundance (in some cases to zero) of SONCC coho salmon in several streams throughout the ESU indicate that the SONCC coho salmon's spatial structure is more fragmented at the population-level than at the ESU scale. The genetic and life history diversity of populations of SONCC coho salmon is likely very low and is inadequate to contribute to a viable ESU, given the significant reductions in abundance and distribution. The most recent status review reaffirmed the ESU's threatened status (NMFS 2016a).

2.2.2.2 CCC coho salmon

Historically, the CCC coho salmon ESU was comprised of approximately 76 coho salmon populations. Most of these were dependent populations that needed immigration from other nearby populations to ensure their long-term survival. Eleven functionally independent populations and one potentially independent population of CCC coho salmon existed (Spence et al. 2008, NMFS 2012). Most of the populations in the CCC coho salmon ESU are currently are not viable, hampered by low abundance, range constriction, fragmentation, and loss of genetic diversity.

Brown et al. (1994) estimated that annual spawning numbers of coho salmon in California ranged between 200,000 and 500,000 fish in the 1940's. Abundance declined further to 100,000 fish by the 1960's, then to an estimated 31,000 fish in 1991. More recent abundance estimates vary from approximately 600 to 5,500 adults (Good et al. 2005). CCC coho salmon have also experienced acute range restriction and fragmentation. Adams et al. (1999) found that in the mid 1990's, coho salmon were present in 51 percent (98 of 191) of the streams where they were historically present, and documented an additional 23 streams within the CCC coho salmon ESU in which coho salmon were found for which there were no historical records. Recent genetic research has documented reduced genetic diversity within subpopulations of the CCC coho salmon ESU (Bjorkstedt et al. 2005), likely resulting from inter-breeding between hatchery fish and wild stocks.

Available data from the few remaining independent populations suggests population abundance continues to decline, and many independent populations that in the past supported the species

abundance and geographic distributions have been extirpated. This suggests that populations that historically provided support to dependent populations via immigration have not been able to provide enough immigrants to support dependent populations for several decades.
None of the five CCC coho salmon diversity strata defined by Bjorkstedt et al. (2005) currently support viable coho salmon populations. According to Williams et al. (2016), recent surveys suggest CCC coho salmon abundance has improved slightly since 2011 within several independent populations (including Lagunitas Creek), although all populations remain well below their high-risk dispensation thresholds identified by Spence et al. (2008). The Russian River and Lagunitas Creek populations are relative strongholds for the species compared to other CCC coho salmon populations, the former predominantly due to out-planting of hatchery-reared juvenile fish. The overall risk of CCC coho salmon extinction remains high, and the most recent status review reaffirmed the ESU's endangered status (NMFS 2016b).

2.2.2.3 CC Chinook salmon

The CC Chinook salmon ESU was historically comprised of approximately 32 Chinook salmon populations (Bjorkstedt et al. 2005). Many of these populations (about 14) were independent, or potentially independent, meaning they had a high likelihood of surviving for 100 years absent anthropogenic impacts. The remaining populations were likely more dependent upon immigration from nearby independent populations than dependent populations of other salmonids (Bjorkstedt et al. 2005).

In 1965, CDFG (1965) estimated escapement for this ESU at over 76,000 spawning adults. Most were in the Eel River (55,500), with smaller populations in Redwood Creek (5,000), Mad River (5,000), Mattole River (5,000), Russian River (500) and several smaller streams in Humboldt County (Myers et al. 1998). Currently available data indicate abundance is far lower, suggesting an inability to sustain production adequate to maintain the ESU’s populations. The one exception is the Russian River population, where escapement typically averages a few thousand adults (Sonoma Water 2020).

CC Chinook salmon populations remain widely distributed throughout much of the ESU. Notable exceptions include the area between the Navarro River and Russian River and the area between the Mattole and Ten Mile River populations (Lost Coast area). Concerns regarding the lack of population-level estimates of abundance, the loss of populations from one diversity stratum[3], as well poor ocean survival contributed to the conclusion that CC Chinook salmon are “likely to become endangered” in the foreseeable future (Good et al. 2005, Williams et al. 2011, Williams et al. 2016). The most recent status review describes the discovery of spawning adults in several smaller, coastal Mendocino County tributaries where they had not been previously documented, which suggests ESU spatial diversity is likely better than previously thought (NMFS 2016c). The same status review reaffirmed the ESU’s threatened status (NMFS 2016c).

[3] A diversity stratum is a grouping of populations that share similar genetic features and live in similar ecological conditions.

2.2.2.4 NC Steelhead

With few exceptions, NC steelhead are present wherever streams are accessible to anadromous fish and have sufficient flows. The most recent status review (NMFS 2016c) reports that available information for winter-run and summer-run populations of NC steelhead do not suggest an appreciable increase or decrease in extinction risk since publication of the previous status review update in 2011 (NMFS 2011). Williams et al. (2016) found that population abundance was very low relative to historical estimates, and recent trends are downwards in most stocks. NC steelhead remain broadly distributed throughout their range, with the exception of habitat upstream of dams on both the Mad River and Eel River, which has reduced the extent of available habitat. Extant summer-run steelhead populations exist in Redwood Creek and the Mad, Eel (Middle Fork) and Mattole Rivers. The abundance of summer-run steelhead was considered "very low" in 1996 (Good et al. 2005), indicating that an important component of life history diversity in this DPS is at risk. Hatchery practices in this DPS have exposed the wild population to genetic introgression and the potential for deleterious interactions between native stock and introduced steelhead. However, abundance and productivity in this DPS are of most concern, relative to NC steelhead spatial structure and diversity (Williams et al. 2011). The most recent status review for NC steelhead (NMFS 2016c) concludes NC steelhead, despite recent conservation efforts, remain impacted by many of the factors that led to the species being listed as threatened. Low streamflow volume, illegal cannabis cultivation, and periods of poor ocean productivity continue to depress NC steelhead population viability. The most recent status review reaffirmed the DPS's threatened status (NMFS 2016c).

2.2.2.5 CCC Steelhead

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

While historical and present data on abundance are limited, CCC steelhead numbers are substantially reduced from historical levels. A total of 94,000 adult steelhead were estimated to spawn in the rivers of this DPS in the mid-1960s, including 50,000 fish in the Russian River -the largest population within the DPS (Busby et al. 1996). Recent estimates for the Russian River are on the order of 4,000 fish (NMFS 1997). Abundance estimates for smaller coastal streams in the DPS indicate low but stable levels with recent estimates for several streams (Lagunitas, Waddell, Scott, San Vicente, Pudding, and Caspar creeks) of individual run sizes of 500 fish or less (62 FR 43937). Some loss of genetic diversity has been documented and attributed to previous among-basin transfers of stock and local hatchery production in interior populations in the Russian River (Bjorkstedt et al. 2005). In San Francisco Bay streams, reduced population sizes and fragmented habitat condition has likely also depressed genetic diversity in these populations.

A recent viability assessment of CCC steelhead concluded that populations in watersheds that drain to San Francisco Bay are highly unlikely to be viable, and that the limited information available did not indicate that any other CCC steelhead populations were demonstrably viable

(Spence et al. 2008). Although there were average returns (based on the last ten years) of adult CCC steelhead during 2007/08, research monitoring data from the 2008/09 and 2009/10 adult CCC steelhead returns show a decline in returning adults across their range compared to the previous ten years. The most recent status review reaffirmed the DPS's threatened status (NMFS 2016d).

2.2.2.6 S-CCC Steelhead

Populations of S-CCC steelhead throughout the DPS have exhibited a long-term negative trend since at least the mid-1960s. In the mid-1960s, total spawning population was estimated at 17,750 individuals (Goode et al. 2005). Available information shows S-CCC steelhead population abundance continued to decline from the 1970s to the 1990s (Busby et al. 1996) and more recent data indicate this trend continues (Good et al. 2005). Current S-CCC steelhead run-sizes in the five largest river systems in the DPS (Pajaro River, Salinas River, Carmel River, Little Sur River, and Big Sur River) are likely reduced from 4,750 adults in 1965 (CDFG 1965) to less than 500 returning adult fish in 1996. More recent estimates for total run-size do not exist for the S-CCC steelhead DPS (Goode et al. 2005) as few comprehensive or population monitoring programs are in place.

The S-CCC steelhead DPS consists of 12 discrete sub-populations representing localized groups of interbreeding individuals, and none of these sub-populations currently meet the definition of viable (Boughton et al. 2006, Boughton et al. 2007). Most of these sub-populations are characterized by low population abundance, variable or negative population growth rates, and reduced spatial structure and diversity. The sub-populations in the Pajaro River and Salinas River[4] watersheds are in particularly poor condition (relative to watershed size) and exhibit a greater lack of viability than many of the coastal populations.

Although steelhead are present in most of the streams in the S-CCC DPS (Good et al. 2005), their populations remain small, fragmented, and unstable (more subject to stochastic events) (Boughton et al. 2006). In addition, severe habitat degradation and the compromised genetic integrity of some populations pose a serious risk to the survival and recovery of the S-CCC steelhead DPS (Good et al. 2005). During the winter of 2010/11, adult returns appeared to rebound toward the numbers seen at the beginning of the decade. This is largely based on a significant increase in adult returns counted at the San Clemente Dam on the Carmel River[5], and a notable increase in the number of observed adults in Uvas Creek in the Pajaro River watershed. However, these increases in adult returns have not persisted in recent years, suggesting poor recovery following the 2011-2015 state-wide drought that severely limited population productivity.

In the 2011 status update, NMFS concluded there was no evidence to suggest the status of the S-CCC steelhead DPS has changed appreciably since the publication of the previous status review

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[4] The Technical Review Team only identified multiple populations in the Salinas River system for the purposes of DPS viability analysis. However, for the purposes of the threat analysis (and corresponding recovery actions), the Pajaro River was broken into the Uvas Creek tributary and the remainder of the Pajaro River system (which includes the mainstem and other tributaries). Uvas Creek was singled out because of its importance and the large number of threats.

[5] http://www.mpwmd.dst.ca.us/fishcounter/fishcounter.htm

(Goode et al. 2005) and, therefore, S-CCC steelhead remain listed as threatened (Williams et al. 2011). The most recent status review reaffirmed the DPS's threatened status (NMFS 2016e).

2.2.3 Status of critical habitat

In designating critical habitat, NMFS considers, among other things, the following requirements of the species: 1) space for individual and population growth, and for normal behavior; 2) food, water, air, light, minerals, or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for breeding, reproduction, or rearing offspring; and, generally; and 5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species (50 CFR 424.12(b)). In addition to these factors, NMFS also focuses on Physical or Biological Features (PBF) and/or essential habitat types within the designated area that are essential to the conservation of the species and that may require special management considerations or protection (81 FR 7214).

The designations of critical habitat for the species described above previously used the term primary constituent element or essential features. The new critical habitat regulations (81 FR 7214) replace this term with PBFs. The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified primary constituent elements, physical or biological features, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

In designating critical habitat, NMFS considers, among other things, the following requirements of the species: 1) space for individual and population growth, and for normal behavior; 2) food, water, air, light, minerals, or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for breeding, reproduction, or rearing offspring; and, generally; and 5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species (50 CFR 424.12(b)). In addition to these factors, NMFS also focuses on PBFs and/or essential habitat types within the designated area that are essential to conserving the species and that may require special management considerations or protection.

For SONCC and CCC coho salmon critical habitat, the following PBFs were identified: 1) juvenile summer and winter rearing areas; 2) juvenile migration corridors; 3) areas for growth and development to adulthood; 4) adult migration corridors; and 5) spawning areas. Within these areas, essential features of coho salmon critical habitat include adequate: 1) substrate, 2) water quality, 3) water quantity, 4) water temperature, 5) water velocity, 6) cover/shelter, 7) food, 8) riparian vegetation, 9) space, and 10) safe passage conditions (64 FR 24029).

PBFs for CC Chinook salmon and NC, CCC and S-CCC steelhead critical habitat, and their associated essential features within freshwater include:

- freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;
- freshwater rearing sites with:
- water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;

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

The condition of critical habitat for SONCC and CCC coho salmon, CC Chinook salmon, and NC, CCC, and S-CCC steelhead, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS's recovery plans for these species describe how the currently depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat[6]: logging, agriculture, mining, urbanization, stream channelization, dams, wetland loss, and water withdrawals (including unscreened diversions for irrigation) (NMFS 2012, NMFS 2013, NMFS 2014, NMFS 2016f). Impacts of concern include altered stream bank and channel morphology, elevated water temperature, lost spawning and rearing habitat, habitat fragmentation, impaired gravel and wood recruitment from upstream sources, degraded water quality, lost riparian vegetation, and increased erosion into streams from upland areas (Weitkamp et al. 1995; Busby et al. 1996; (NMFS 2012, NMFS 2013, NMFS 2014, NMFS 2016f, 64 FR 24049; 70 FR 37160; 70 FR 52488). Diversion and storage of river and stream flow has dramatically altered the natural hydrologic cycle in many of the streams within the ESU/DPSs (NMFS 2012, NMFS 2013, NMFS 2014, NMFS 2016f). As identified in the NMFS recovery plans for these species, altered flow regimes can delay or preclude migration, dewater aquatic habitat, and strand fish in disconnected pools, while unscreened diversions can entrain juvenile fish (NMFS 2012, NMFS 2013, NMFS 2014, NMFS 2016f).

2.2.4 Climate Change Impacts on Coho Salmon, Chinook salmon, Coho Salmon, Steelhead, and their Critical Habitat

One factor affecting the rangewide status of the steelhead, salmon, and their aquatic habitat at large is climate change. Impacts from global climate change are already occurring in California. For example, average annual air temperatures, heat extremes, and sea level have all increased in California over the last century (Kadir et al. 2013). Snow melt from the Sierra Nevada has declined (Kadir et al. 2013). However, total annual precipitation amounts have shown no discernable change (Kadir et al. 2013). Most ESUs and DPSs may have already experienced some detrimental impacts from climate change. NMFS believes the impacts on listed salmonids to date are likely fairly minor because natural, and local climate factors likely still drive most of the climatic conditions steelhead experience, and many of these factors have much less influence on steelhead abundance and distribution than human disturbance across the landscape. In addition, The ESUs and DPSs considered in this opinion, for the most part, are not dependent on

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

snowmelt driven streams and, thus, not as affected by declining snow packs as, for example, California Central Valley species.

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

Shifting climate patterns across coastal California may impair salmon and steelhead population productivity in the future. For example, in the San Francisco Bay region, warm temperatures generally occur in July and August, but as climate change takes hold, the occurrences of these events will likely begin in June and could continue to occur in September (Cayan et al. 2012). Climate simulation models project that the San Francisco region will maintain its Mediterranean climate regime, but will also experience a higher degree of variability of annual precipitation during the next 50 years. The greatest reduction in precipitation is projected to occur in March and April, with the core winter months remaining relatively unchanged (Cayan et al. 2012).

Estuaries may also experience changes detrimental to salmonids. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia et al. 2002, Ruggiero et al. 2010). In marine environments, ecosystems and habitats important to juvenile and adult salmonids are likely to experience changes in temperatures, circulation, water chemistry, and food supplies (Brewer and Barry 2008, Feely et al. 2004, Osgood 2008, Turley 2008, Abdul-Aziz et al. 2011, Doney et al. 2012). The projections described above are for the mid to late 21st Century. In shorter time frames, climate conditions not caused by the human addition of carbon dioxide to the atmosphere are more likely to predominate (Cox and Stephenson 2007, Santer et al. 2011).

Changing ocean conditions in the Pacific Northwest, caused by global climate change, present a potentially severe threat to eulachon survival and recovery. Increases in ocean temperatures have already occurred and will likely continue to impact listed fish and their habitats. In coastal and estuarine ecosystems, the threats from climate change largely come in the form of sea level rise and the loss of coastal wetlands. Sea levels will likely rise exponentially over the next 100 years, with possibly a 43-84 cm rise by the end of the 21st century (IPCC 2019). In addition, changes in climate along the entire Pacific Coast and along northern California and southern Oregon coasts will further change hydrologic patterns and ultimately pose challenges to eulachon spawning because of decreased snowpack, increased peak flows, and decreased base flow.

2.3 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

The action area is all stream channels, estuarine habitat, riparian areas, wetlands and hydrologically linked upslope areas affected by the implementation of restoration projects authorized and permitted under the program and within the jurisdiction of the Corps' San Francisco District (Figure 1), including tidally influenced areas that are jointly under the jurisdiction of the California Coastal Commission. Areas under the jurisdiction of the San Francisco Bay Conservation and Development Commission (Commission) are not included within the proposed action[7]. The action area includes all coastal anadromous California streams from Del Norte County at the Oregon/California border south to San Luis Obispo County, and all streams draining into San Francisco and San Pablo bays eastward to the Napa River (inclusive). The action area does not include the Sacramento-San Joaquin River Basin, or the tidally influenced portions of tributaries draining into San Francisco and San Pablo bays.

Figure 1: California U.S. Army Corps of Engineers District Regulatory Boundaries, with the San Francisco District (the action area) shown in light blue.

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[7]This is due to the Commission's additional permitting requirements. Program projects will not occur in these areas.

The action area for RGP-12 encompasses a range of environmental conditions and numerous listed salmonid ESUs/DPSs, and has been broken into the four geographic areas- North Coast, North Central Coast, San Francisco Bay, and Central Coast (Figure 2). Effects resulting from most restoration activities will be restricted to the immediate restoration project site, while some activities may result in turbidity for a short distance (1,500 feet) downstream. The specific location for each individual habitat restoration project cannot be described, as these locations have not yet been identified. These locations will vary depending on project type, specific project methods, site conditions, and habitat restoration opportunities.

Figure 2: Geographic areas within the action area.

2.4 Environmental Baseline

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. 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 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

Restoration projects that have been accepted into the Program up to this point, including both those with some implementation completed and those for which implementation has not yet begun, have been analyzed under the existing RGP-12 programmatic biological opinion (WCRO-2020-02938) and are part of the environmental baseline for the current proposed action.

The action area encompasses approximately 26,693 square miles of the central and northern California Coast Range. Native vegetation in the action area varies from old-growth redwood (*Sequoia sempervirens*) forest along the coastal drainages to Douglas fir (*Pseudotsuga menziesii*) intermixed with hardwoods in the foothills to ponderosa pine (*Pinus ponderosa*), and Jeffery pine (*P. jefferyi*) stands common within the upper elevations. Areas of grasslands (e.g., oak woodland habitat) are along ridge tops and south-facing slopes of some watersheds.

For the most part, the action area has a Mediterranean climate characterized by cool, wet winters with typically high runoff and dry, warm summers characterized by low instream flows. Fog is a dominant climatic feature along the coast, generally occurring daily in the summer and not infrequently throughout the year. Higher elevations and inland areas tend to be relatively fog free. Most precipitation falls during the winter and early spring as rain, with occasional snow at higher elevations, especially in the interior mountainous regions of northern California. Average air temperatures range from 46° to 56° F along the coast. Further inland and in the southern part of the action area, annual air temperatures are much more varied, ranging from below freezing in winter to over 100° F during the summer months. The action area will change in the future due to climate change. See the status of the species and critical habitat section (2.3) for more information. Changes in the action area are, overall, likely to be similar to those discussed above in section 2.3, and are described in more detail below in section 2.4.3.

High seasonal rainfall on bedrock and other geologic units with relatively low permeability, erodible soils, and steep slopes contribute to the flashy nature (stream flows rise and fall quickly) of the watersheds within the action area. In addition, these high natural runoff rates have been increased by extensive road systems and other land uses. High seasonal rainfall and rapid runoff rates on unstable soils deliver large amounts of sediment to river systems. As a result, many river systems within the action area contain a relatively large sediment load, typically deposited throughout the lower gradient reaches of these systems.

2.4.1 Status of, and factors affecting, the species and critical habitat in the Action Area

This section provides a synopsis of the geographic area of consideration, the ESUs and watersheds present, specific recent information on the status of salmon and steelhead in the action area, and a summary of the factors affecting the listed species residing within the action area. The best information presently available demonstrates that a multitude of factors, past and present, have contributed to the decline of west coast salmonids (NMFS 2012, 2013, 2014, 2016f). The following summarizes the factors affecting the environment of the species or critical habitat in the action area. The geographic area boundaries are shown in Figure 2.

2.4.1.1 North Coast Area

This area includes all coastal streams entering the Pacific Ocean from Oregon/California Border south to Bear Harbor in Mendocino County. It includes the following USGS 4th field HUCs: Upper Klamath, Lower Klamath, Shasta, Scott, Smith, Salmon, Trinity, South Fork Trinity, Mad-Redwood, Lower Eel, South Fork Eel, Middle Fork Eel, and Upper Eel. Urban development within the North Coast Area is found primarily on the estuaries of the larger streams, though there are some small towns and rural residences throughout the area.

Although forestry is the dominant land use throughout the area, limited agriculture exists. The area includes the California portion of the SONCC coho salmon ESU, the northern part of the CC Chinook salmon ESU, and the northern portion of the NC steelhead DPS, and contains designated critical habitat for all three species.

Generally speaking, excessive fine sediment and poor water quality/quantity are the predominant factors limiting salmonid survival and recovery throughout the North Coast area. Past logging and road building practices caused extensive hillside erosion within the Klamath River, Mad River, Redwood Creek, Eel River, and Mattole River watersheds. During the same period, massive floods, such as the 1964 incident, accelerated current erosion rates, which caused fine sediment deposition and pool aggradation that remains to this day. Poor water quality and low streamflow volume impacts much of the region, although the cause of these conditions varies based upon location. Agricultural water demand in the upper Klamath River, Shasta River, and Scott River watersheds has depressed SONCC coho salmon abundance and spatial diversity. Mainstem Klamath River reservoirs block fish passage, interrupt natural river hydrology, and support aquatic disease outbreaks by warming and enriching stored water (via eutrophication) before release downstream (NMFS 2014). The lack of bedload-moving winter discharge and warm spring river flows has allowed a native salmon pathogen (C. Shasta) to flourish, significantly depressing smolt coho salmon survival during their downstream migration.

Further south within the Eel and Mattole drainage, illegal cannabis cultivation has denuded hillsides, drained summer baseflow from streams, and polluted waterways with chemical pesticides and fertilizers. State regulation of legal cannabis growers and increased enforcement targeting illegal operators will likely minimize cannabis-related impacts in the future. In contrast, the plan to remove the Klamath River dams will greatly improve salmonid population abundance, distribution, and productivity in the coming decades.

Compared to areas toward the southern end of the action area, the watersheds of the North Coast contain salmon and steelhead populations that, while currently remaining far from their respective recovery targets, exhibit greater abundance and spatial diversity. SONCC coho salmon populations are struggling in the Klamath Basin, where important tributary populations (e.g., Shasta and Scott) are at risk of losing weak brood-year classes. For example, of particular concern is the low adult coho salmon return to the Shasta River during 2014-15 (NMFS 2016a). CC Chinook salmon appear to be recovering from poor survival rates during California's 2011-2015 drought, but most populations in the North Coast Area remain well below recovery thresholds for population abundance. NC steelhead remain well distributed throughout the North Coast, but population abundance remains well below viability thresholds (NMFS 2016c). Both species are facing another severe drought that is affecting the majority of the populations within CC Chinook salmon and NC steelhead's range.

2.4.1.2 North Central Coast Area

The North Central Coast area includes all coastal California streams entering the Pacific Ocean in Mendocino, Sonoma, and Marin counties, excluding streams draining into San Francisco and San Pablo bays. The North Central Coast Area includes portions of four ESUs/DPSs (CCC coho salmon, CC Chinook, NC steelhead, and CCC steelhead) and five USGS 4th field HUCs (Big-Navarro-Garcia, Bodega Bay, Gualala-Salmon, Russian, and Tomales-Drakes Bay). Forestry is the dominant land-use throughout the northern part of this area (north of the Russian River). Agriculture and urbanization are more predominant in the Russian River and areas south.

Excessive sedimentation, low large wood abundance and recruitment, and elevated water temperature are issues limiting salmonid habitat throughout watersheds draining the Mendocino County coast and are generally attributable to historic and ongoing forestry activities. Timber harvest transitions to agriculture and urban development as the dominant land-use south of the Gualala River watershed.

Within the Russian River watershed, Coyote Valley Dam and Warm Springs Dam block access to upstream anadromous fish habitat, alter sediment transport dynamics, and degrade water flow and temperature. Steiner Environmental Consulting (1996) cite unpublished data from the CSWRCB that estimates there were over 500 small, private dams within the watershed that cause similar problems; a number of those dams have been removed in the last two decades. Historically, the Don Clausen Fish Hatchery, operated at Warm Springs Dam, released coho salmon, Chinook salmon, and steelhead into the Russian River watershed. However, significant changes in hatchery operations began in 1998, in which the production of coho salmon and Chinook salmon was discontinued. Traditional production of steelhead continues at Don Clausen Fish Hatchery. Beginning in 2004, a consortium of federal agencies, state agencies, and local non-profit groups began the Russian River Coho Salmon Captive Broodstock Program at the same hatchery, which raises and releases hatchery-reared juvenile coho salmon into local watersheds.

Most of the watersheds feeding Tomales and Drakes bay are small, except for Walker Creek and Lagunitas Creek. Although urbanization has been limited, flood control activities, contaminated runoff from paved lots and roads, and seepage from improperly designed and/or maintained septic systems continue to impact habitat and water quality in portions of the watershed

(Ketcham 2003). The construction of Kent Reservoir and Nicasio Reservoir on Lagunitas Creek blocked access to half of the historical salmonid habitat. Similarly, Soulejoule Reservoir precludes access to a significant amount of headwater stream habitat within the remainder of the watershed (NMFS 2012, NMFS 2016f). Overwinter habitat is limiting within Lagunitas Creek primarily due to poor large woody recruitment and limited floodplain engagement (NMFS 2016f). Within Walker Creek, high fine sediment concentrations lower pool depth and density, while also embedding spawning gravel.

Steelhead are generally widely distributed throughout North Central Coast Area basins, although abundance levels are far below recovery targets. Chinook salmon persist in small numbers along the Mendocino Coast; however, a robust, stable population exists in the Russian River, primarily supported by reservoir releases into the mainstem river and Dry Creek. Coho salmon persist in very small numbers throughout the area, with the exception of the smaller watersheds between Salmon Creek and Tomales Bay where no historical account of their existence exists. Sampling between 2009 and 2013 documented coho salmon adult spawning and juvenile rearing throughout Salmon Creek (Sonoma County) and its five main tributaries (Gold Ridge Resource Conservation District 2013). NMFS found no historical coho salmon collections from watersheds of this HUC between Valley Ford Creek and Tomales Bay. A broodstock hatchery operates at the Don Clausen Fish Hatchery (Russian River), stocking captively-bred juvenile coho salmon into tributaries of the lower Russian River. Occasionally excess juvenile coho will be stocked into Olema Creek, and Walker Creek. Lagunitas Creek has a relatively stable and healthy population of coho salmon, at least when compared with other CCC coho salmon streams (NMFS 2012, NMFS 2016f).

2.4.1.3 San Francisco Bay Area

The San Francisco Bay Area encompasses all streams draining into San Francisco and San Pablo bays eastward to the Napa River (inclusive). The action area excludes San Francisco Bay, the Sacramento-San Joaquin River Basin, and the tidally influenced portions of tributaries draining into San Francisco and San Pablo bays. Urban development is extensive within this area and has negatively affected the quality and quantity of salmonid habitat; it is within these areas where most projects associated with the proposed action will likely take place. Human population within the San Francisco Bay Area is approximately seven million (2010 census), representing the fourth most populous metropolitan area in the United States, and continued growth is expected. In the past 150 years, the diking and filling of tidal marshes has decreased the surface area of the greater San Francisco Bay by 37 percent, which has diminished tidal marsh habitat, increased pollutant loadings to the estuary, and degraded shoreline habitat due to the installation of docks, shipping piers, marinas, and miles of rock riprap for erosion protection. Most tributary streams have lost habitat through channelization, riparian vegetation removal, water development, and reduced water quality. Dams blocking anadromy are present on most streams and are used for water supply, aquifer recharge, or recreational activities. Surface water diversions and groundwater withdrawals have affected streams. Channelization for flood control, roadway construction, and commercial/residential development has further affected the quality and quantity of available salmonid habitat. Most watersheds within this area are listed under the 2014-16 Clean Water Act section 303(d) list of impaired water bodies for high levels of diazinon, reflecting the impacts of urbanization. Agricultural and industrial chemicals and by-products limit water quality throughout the area (CSWRCB 2014). These human-induced changes have substantially degraded natural productivity, biodiversity, and ecological integrity in streams throughout the region.

Presently, small populations of CCC steelhead occur in Arroyo Corte Madera del Presido, Corte Madera Creek, Napa River, Sonoma Creek, Petaluma River, Novato Creek, Pinole Creek, Coyote Creek, Guadalupe River, San Francisquito Creek, and Stevens Creek (NMFS 2016d). Further south, small numbers of CCC steelhead occur in a few watersheds that drain into South San Francisco Bay: Coyote Creek, Guadalupe River, San Francisquito Creek, and Stevens Creek. Also, small populations of CCC steelhead are found in Codornices Creek, San Leandro Creek, and San Lorenzo Creek below dams located in the east bay hills (NMFS 2016f). Alameda Creek historically supported the largest CCC steelhead population draining into San Francisco Bay, but diversion facilities, water storage reservoirs, and channelization have all but eliminated fish passage into the watershed.

2.4.1.4 Central Coast Area

The Central Coast Area encompasses the coastal area from San Francisco County south along the California coast to the southern extent of San Luis Obispo County. It includes coastal watersheds supporting CCC coho salmon, CCC steelhead, and S-CCC steelhead.

In general, summer streamflow volume decreases from north to south within the Central Coast Area. In addition to the highly urbanized areas of San Francisco, Pacifica, Half Moon Bay, Santa Cruz, the Monterey Peninsula, Hollister, Gilroy, Salinas, and San Luis Obispo, portions of the Central Coast Area have low density rural residential development. The majority of the Central Coast Area is privately owned. However, portions under public ownership include Open Space in San Mateo County, State parklands in Santa Cruz County, and Federal lands in southern Monterey County. Anthropogenic factors affecting listed salmonids in the central coast area include water impoundments, urbanization, surface water diversion, groundwater withdrawal, in-channel sediment extraction, agriculture, flood control projects, and logging (NMFS 2013). Agriculture has had the greatest impact on the Pajaro and Salinas HUCs, while logging and urbanization have had the greatest impact on watersheds further north, such as the San Lorenzo River. Reservoirs on the San Lorenzo, Pajaro, Salinas, and Carmel rivers block fish passage, regulate downstream flows, and alter the downstream movement of sediment and wood. Due to pollutants linked to urban development and agriculture, most waterbodies in the Central Coast area are included on the 2014-16 Clean Water Act section 303(d) list of water quality limited segments (CSWRCB 2014).

Long-term data on the abundance of coho salmon in coastal tributaries of San Mateo and Santa Cruz counties are limited. Historical records document the presence of coho salmon in Waddell Creek, East Branch Waddell Creek, Scott Creek, Big Creek, San Vicente Creek, San Lorenzo River, Hare Creek, Soquel Creek, and Aptos Creek. While coho salmon abundance has fallen significantly compared to historical numbers, recent surveys suggest a wider distribution and greater abundance of coho salmon than thought during past status reviews (NMFS 2016b).

Steelhead are widely distributed throughout the Central Coast area, although similarly significantly reduced from levels seen several decades ago (NMFS 2016f). Two of the largest tributaries of the Salinas River, the San Antonio and Nacimiento rivers, have been dammed, eliminating steelhead access to valuable spawning and rearing habitat and severely modifying streamflow (NMFS 2013). Other anthropogenic activities severely impacting steelhead habitat include in-channel sediment extraction, channel modification, and water withdrawals for agricultural use (NMFS 2013). Aside from the Big Sur and Little Big Sur rivers, which flow through California State Park land and contain relatively intact habitat, most coastal streams south of Carmel are short and steep drainages supporting small S-CCC steelhead populations.

2.4.2 Ongoing Drought

Salmonid populations are struggling throughout the west coast due to persistent drought. The following language is taken from Williams et al. (2016), which provides a description of the effects of recent drought conditions on listed salmonids in California, but has been updated to include those similar conditions that have occurred since 2016.

California has experienced well below average precipitation over the last decade (2010-2022). Some paleoclimate reconstructions suggest that the current drought is the most extreme in the past 500 or perhaps more than 1,000 years. Anomalously high surface temperatures have amplified the effects of drought on water availability This period 2010-2022 of drought and high air, stream, and upper-ocean temperatures have together likely had negative impacts on the freshwater, estuary, and marine phases for many populations of coho salmon, Chinook salmon, and steelhead.

2.4.3 Climate Change

The threat of climate change to listed coho salmon, Chinook salmon, and steelhead will likely be lower in the northern coastal sections of the action area due to the fog zone and benefits of old growth redwood forests, including shady, complex stream and riparian areas, and cool stream temperatures (NMFS 2014, NMFS 2016f). In particular, the Redwood Creek (Humboldt County) watershed should continue to act as a refuge for salmonids due to the preponderance of protected parklands, old growth forest, the cool, coastal climate, and continuing restoration efforts. Climate change will impact forests of the western U.S., which dominate the landscape of many watersheds in the region. Forests are already showing evidence of increased drought severity, forest fire, and insect outbreak (Halofsky et al. 2020). Additionally, climate change will affect tree reproduction, growth, and phenology, which will lead to spatial shifts in vegetation. Halofsky et al. (2018) projected that the largest changes will occur at low- and high-elevation forests, with expansion of low-elevation dry forests and diminishing high-elevation cold forests and subalpine habitats.

The effects of climate change will be more pronounced further inland and in the more central and southern sections of the action area. CCC coho salmon, CCC steelhead and S-CCC will be more adversely affected by the changing climate. Recent evidence suggests that climate and weather is expected to become more extreme, with an increased frequency of drought and flooding (IPCC 2019). Water temperatures will reach extremes during the summer months with the combined effect of reduced flow and warmer air temperatures. These long-term effects may include, but are not limited to, depletion of cold-water habitat, variation in quality and quantity of tributary rearing habitat, alterations to migration patterns, accelerated embryo development, premature emergence of fry, increased bio-energetic and disease stresses on fish, and increased competition among species.

In coastal and estuarine ecosystems, the threats from climate change largely come in the form of sea level rise and the loss of coastal wetlands. Sea levels will likely rise exponentially over the next 100 years, with possibly a 43-84 cm rise by the end of the 21st century (IPCC 2019). This rise in sea level will alter the habitat in estuaries and either provide an increased opportunity for feeding and growth or in some cases will lead to the loss of estuarine habitat and a decreased potential for estuarine rearing.

Marine ecosystems face an entirely unique set of stressors related to global climate change, all of which may have deleterious impacts on growth and survival while at sea. In general, the effects of changing climate on marine ecosystems are not well understood given the high degree of complexity and the overlapping climatic shifts that are already in place (e.g., El Niño, La Niña, and Pacific Decadal Oscillation) and will interact with global climate changes in unknown and unpredictable ways. Overall, climate change is believed to represent a growing threat, and will challenge the resilience of salmonids and other species in coastal Central and Northern California.

2.4.4 Previous Section 7 Consultations and Section 10 Permits in the Action Area

Given the large spatial area where individual restoration projects may occur, many past Section 7 consultations and Section 10 permits have occurred within the action area, including the consultation for the previous Corps RGP-12 permit noted above. The majority of the consultations were informal and did not adversely affect listed species. A low number (less than 50) of formal biological opinions are produced each year in the action area for this consultation that authorize take and have terms and conditions that minimize take of listed anadromous fish. Jeopardy opinions have been issued for proposed actions within a few watersheds in the action area (i.e., Klamath River and Eel River). For each, modifications were made to dam operations to avoid jeopardizing listed species and adversely modifying critical habitat.

In December 2021, NMFS completed a section 7 consultation (WCRO-2021-01946) with the Federal Energy Regulatory Commission on the proposed removal of four dams on the Klamath River, which is expected to overlap with the proposed action. The current environmental baseline in the mainstem Klamath River is expected to change as a result of dam removal. For example, sediment stored behind the dams will move downstream and potentially affect the riverbed in the action area. Adverse effects to SONCC coho salmon will be short-term and affect different year classes and the project will likely kill a relatively small percentage of the total number of juvenile coho salmon in the Upper Klamath River population in the year of drawdown and is not expected to eliminate any one-year class. We believe these changes to the environmental baseline will not affect our analyses of impacts of the proposed action.

2.5 Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. 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. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered 50 CFR 402.17(a) and (b).

The Rangewide Status of Species and Critical Habitat (section 2.2), describes the life histories and status of listed salmonids affected by the Proposed Action (SONCC coho salmon, CCC coho salmon, CC Chinook salmon, NC steelhead, CCC steelhead, and S-CCC steelhead), as well as the status of designated critical habitat for these species. Juvenile salmonids are the life stages most likely to be exposed to any effects resulting from construction activities. The Program's construction season (June 15 to November 1) is designed to avoid the migratory adult life stage of salmonids, so few, if any, adults are expected to be present. Because some of the Program's monitoring activities may occur throughout the year, both juveniles and holding or migratory salmonids may be present. CDFW will seek Corps renewal of RGP-12 every five years, but this ESA analysis assumes the program will continue into the future and so is not limited to a five-year time horizon.

2.5.1 Effects to Species

NMFS expects Program implementation to cause adverse effects to limited numbers of individual juvenile SONCC coho salmon, CCC coho salmon, CC Chinook salmon, NC steelhead, CCC steelhead, and S-CCC steelhead. The construction season (June 15 – November 1) is designed to avoid the migratory periods of adult salmon and steelhead, but small numbers of adult salmonids may linger in the action area during this period. Juveniles and a low number of adults may therefore be present during the construction season, and both juveniles and adults may be present during monitoring activities carried out by CDFW year-round). Due to the protective measures described on pages 41-52 of section 2.9 of the BA (CDFW 2022), NMFS expects that any adults present in the area of interest will be detected by monitors and avoided prior to capture. In addition, adult salmonids are expected to avoid areas of disturbance and evade capture methods designed to capture juvenile fish. Therefore, no adverse effects to adult salmonids are anticipated.

2.5.1.1 Noise, Motion, and Vibration Disturbance

Noise, motion, and vibration disturbance resulting from activity in the channel may cause minor and temporary behavioral effects to listed species. NMFS expects any juvenile or adult salmonids present in the Action Area during the construction season to temporarily move to other available areas to avoid episodic areas of disturbance, resulting in minor, temporary changes in fish behavior (an hour or less). Any fish present during construction activities are expected to detect areas of disturbance, actively avoid those portions of a project footprint where heavy equipment is operated, and move into undisturbed habitat nearby. Juvenile or adult salmonids may be attracted to activity that stirs up sediment as it can disrupt benthic prey, but are expected to move quickly away whenever they detect an immediate threat. Because these avoidance behaviors will likely be limited to short time periods, we don't anticipate any reductions in the fitness of individual salmonids.

2.5.1.2 Disturbance of riparian and aquatic habitat

NMFS expects any disturbance of riparian and aquatic habitat resulting from Program activities to cause only minor, temporary effects to individual fish, with one exception. The effects to species resulting from mobilization of sediment are discussed in section 2.5.1.6.6 and are not included in the following discussion.

Some degree of disturbance to riparian and aquatic habitat is possible during implementation of every project included in the Program [i.e., when access to the habitat where fish are located is established, and during the implementation of restoration actions (e.g., during actual placement of large wood in a stream)]. The BA (CDFW 2022) and the proposed action section (1.3) include a comprehensive list of protection measures that every project must follow. For example, restoration projects implemented under the Program will avoid disturbing riparian vegetation to the extent possible, as described in the Vegetation and Habitat Disturbance Protection Measures detailed in the proposed action (section 1.3). NMFS expects use of these protection measures will minimize the extent and severity of habitat disturbance to the extent that the effects of this disturbance on fish will be minor and temporary. NMFS expects fish will respond as described in section 2.5.1.1, above.

When reaches are dewatered, or when channels are temporarily filled during grading activities, the benthic aquatic macroinvertebrate populations present in the affected areas will die. As these benthic organisms are part of the food web that provides prey to juvenile salmonids, dewatering will reduce the amount of prey available and temporarily adversely affect the PBF associated with prey resources. The extent of macroinvertebrate loss from any given project is expected to be small because the size of the dewatered area is a small fraction of the total size of the stream systems they occur in, although the dewatered area may represent a larger portion of available summer rearing habitat in any given small stream or reach. Overall, juvenile salmonids are expected to have access to sufficient amounts of macroinvertebrate prey nearby. These effects will end once in-water work is over each year. Once flow is restored to a dewatered zone by the end of the construction season, or winter flows carve a new channel, macroinvertebrates from nearby populations are expected to recolonize affected areas within one to two months (Cushman 1985, Attrill and Thomas 1996, Harvey 1986).

2.5.1.3 Exposure to Toxic Chemicals

The following aspects of the Program have the potential to detrimentally affect water quality: equipment refueling, fluid leakage, and maintenance activities within and near the stream channel; water in contact with wet cement; and herbicide application and drift.

Effects of these activities on species are expected to be minor and temporary, given the extensive protection measures described in the BA (CDFW 2022) and summarized in the proposed action (section 1.3), which should effectively limit or eliminate entry of these chemicals into stream courses. Specifically, the program-wide best management practices, conservation measures, and mitigation and avoidance measures described in section 2.8 of the BA (CDFW 2022) will minimize effects of pollution from equipment refueling, leakage, and maintenance as well as from newly poured concrete. In addition, the Herbicide Use Protection Measures described in section 2.8.2 of the BA (CDFW 2022) will limit or eliminate any herbicide transfer to stream courses. Any fish that do detect toxic chemicals in their environment during the construction season are expected to avoid them by temporarily relocating either upstream or downstream into suitable habitat adjacent to the worksite. Salmonids are particularly vulnerable to herbicide impacts during the incubation stage. However, because no salmonid eggs or embryos would be present during the defined construction or herbicide use period, NMFS expects these life stages will not be exposed to toxic chemicals; any such chemicals that enter streams later (from residual amounts remaining after work is done) will be diluted and flushed from salmonid habitat by fall rains prior to when eggs are laid and embryos emerge.

2.5.1.4 Stress, injury, or death from fish capture, handling, tagging, and/or relocation

All project sites that require dewatering will require relocation of any fish occurring there beforehand. A qualified biologist will capture and relocate fish outside of the restoration project work site prior to draining a reach to enable in-water work, to prevent crushing and desiccation. Fish in the area to be dewatered will be captured using the method most appropriate for particular field conditions, then quickly transferred to buckets of oxygenated water and promptly released in a suitable instream location nearby. The Program requires submission of a dewatering and fish capture and relocation plan for agency review and approval prior to any planned relocation event. This plan will describe the qualifications of staff that will relocate fish, the sufficiency of the field staff that will be available to efficiently move and care for relocated fish, and the suitability of the release location.

Juvenile salmonids are the life stage most likely to be exposed to fish relocation preceding dewatering, because dewatering will occur exclusively during the Program's construction season which avoids the adult migratory periods of salmon and steelhead. Because of their relative mobility, any adults present near construction zones are expected to avoid these zones prior to dewatering. Any adults that made their way into construction areas set for dewatering would be clearly visible to field personnel due to their large size and strong movements. These personnel would establish a means for adult fish to leave the construction area before dewatering efforts began.

Both life stages may be present during project monitoring activities that may occur at any time of year. Due to size and mobility, adults are expected to effectively avoid areas where project monitoring activities are occurring. In addition, before attempting to capture juveniles, monitors will visually scan the area to be sampled with monitoring equipment, watching closely for large salmonids or evidence of their presence (e.g., disturbance of water surface due to top of dorsal fin). While sampling, monitors will watch closely to ensure that no adults are inadvertently captured.

2.5.1.5 Fish observation

Snorkel surveys may be used to observe listed fish without capturing or handling them. NMFS expects such surveys to have minor, temporary effects on observed salmonids. Observation without handling is the least disruptive method for determining a species' presence/absence and estimating their relative numbers. Its effects are also generally the shortest-lived and least harmful of the research activities discussed in this section because a cautious observer can effectively obtain data while only causing only minor, temporary disruption of fish behavior.

Young fish frightened by the turbulence and sound created by observers are likely to seek temporary refuge in deeper water or behind or under rocks or vegetation. In extreme cases, some individuals may leave a particular pool or habitat type and then return when observers leave the area. No injuries or deaths are expected to occur as a result of snorkel surveys.

2.5.1.6 Fish capture methods

The following methods may be used to capture juvenile fish prior to dewatering, or during monitoring activities.

2.5.1.6.1 Electrofishing

Electrofishing may be used to remove fish from areas prior to dewatering activities during the construction season, to monitor salmonids in low water conditions where stream habitat is too complex for seining or minnow traps, or in places where those methods are not effective to inform the monitoring question. During electrofishing, an electrical current is passed through water containing fish (and the fish themselves) in order to stun them, which makes them easy to capture. This method can cause effects of varying severity - from disturbance of fish to immediate mortality. Salmonids can be injured or killed by spinal injuries that sometimes occur due to forced muscle contractions when the current passes through the body. Smaller fish are subjected to a lower voltage gradient than larger fish (Sharber and Carothers 1988), resulting in lower injury rates (e.g., Hollender and Carline 1994, Dalbey et al. 1996, Thompson et al. 1997). The percentage of fish that are injured or killed by electrofishing varies widely depending on the equipment used, the settings on the equipment, the expertise of the technician, and water temperature (Sharber and Carothers 1988, McMichael 1993, Dalbey et al. 1996, Dwyer and White 1997). Studies on the long-term effects of electrofishing indicate that even with spinal injuries, salmonids can survive long-term, although severely injured fish may have stunted growth (Dalbey et al. 1996, Ainslie et al. 1998).

All Program projects will follow the Guidelines for electrofishing waters containing salmonids listed under the Endangered Species Act (NMFS 2000), which describes the appropriate settings for electrofishing gear and a temperature limit above which no electrofishing should occur. When operated by experienced personnel following these guidelines, as expected under this Program, shocked fish normally revive quickly.

2.5.1.6.2 Nets and Traps

Seining methods may be used to capture salmonids in deeper water without significant habitat complexity (e.g., LWD). Minnow traps are typically used in very complex habitats where seining would likely not be successful due to small/large wood and significant aquatic vegetation. Fyke nets may be used in off-channel and slow water habitats when minnow traps and seining are found to not be effective. Dip nets are used to collect fish that are stunned by electrofishing. Rotary screw traps are used to intercept outmigrating juvenile fish in order to document natural population abundance and productivity. The capture of listed salmonids using these methods is likely to cause temporary stress to these fish during transfer from the seine, trap, or net to oxygenated water containing anesthetic. Injury may occur during transfer, but due to the experience level of field staff NMFS expects such injury to be a rare occurrence.

The capture of juvenile fish using these nets and traps, and the removal of fish from nets and traps for further data collection, may cause some stress. Individual study protocols and permit conditions described in the BA (CDFW 2022) reduce the potential for injury or death from fish trapping (e.g., rotary screw traps checked at least daily, limit on water temperature allowed for handling. etc.) Based on data from years of sampling at hundreds of locations under NMFS' 4(d) scientific research and monitoring program, NMFS expects the mortality rate resulting from fish capture and removal from traps and nets, and subsequent handling, to be 3% or less (WCRO-2020-03293).

2.5.1.6.3 Handling and Tagging in Support of Monitoring Activities

After fish are captured, some or all of them (depending on number captured and project monitoring objectives) will be anesthetized, then weighed and measured in support of monitoring objectives. The BA (CDFW 2022) and proposed action section (1.3 describe precautions that will be taken to reduce the degree of fish stress from these procedures (e.g., temperature limits for sampling, close observation of fish while they recover from anesthesia and from any procedures, and monitoring of temperature and dissolved oxygen in the recovery bucket). NMFS expects these precautions to effectively reduce the likelihood of injury or death from handling activities, including tagging fish and clipping their fins.

PIT tags may be inserted into the body cavity of some captured fish after anesthesia. A PIT tag is an electronic device that relays signals to a radio receiver; it allows salmonids to be identified whenever they pass a location containing such a receiver (e.g., any of several dams) without the need for researchers to handle the fish again. PIT tags have very little effect on growth, mortality, or behavior. The few reported studies of PIT tags have shown no effect on growth or survival (Prentice et al., 1987; Jenkins and Smith, 1990; Prentice et al., 1990). For example, in a study between the tailraces of Lower Granite and McNary Dams (225 km), Hockersmith et al. (2000) concluded that the performance of yearling Chinook salmon was not adversely affected by PIT-tags. Additional studies have shown that growth rates among PIT-tagged Snake River juvenile fall Chinook salmon in 1992 (Rondorf and Miller, 1994) were similar to growth rates for salmon that were not tagged (Conner et al., 2001). Prentice and Park (1984) also found that PIT-tagging did not substantially affect survival in juvenile salmonids.

After anesthetic is administered, a single fin may be altered or removed on each fish in order to obtain a non-lethal tissue sample or to allow for later identification of a fish. Many studies have examined the effects of fin-clips on fish growth, survival, and behavior. The results of these studies are somewhat varied; however, it can be said that fin-clips do not generally alter fish growth. Studies comparing the growth of clipped and unclipped fish generally have shown no differences between them (e.g., Brynildson and Brynildson 1967). Moreover, wounds caused by fin-clipping usually heal quickly - especially those caused by partial clips. Mortality among fin-clipped fish is also variable. Some immediate mortality may occur during the marking process, especially if fish have been handled extensively for other purposes. Delayed mortality depends, at least in part, on fish size; small fishes have often been found to be susceptible to it, and Coble (1967) suggested that fish shorter than 90 mm are at particular risk. The degree of mortality among individual fishes also depends on which fin is clipped. Recovery rates are generally recognized as being higher for adipose- and pelvic-fin-clipped fish in comparison to those that are clipped on the pectoral, dorsal, and anal fins (Nicola and Cordone 1973), likely because the adipose and pelvic fins are not as important as the other fins for movement or balance (McNeil and Crossman 1979).

Based on analyses of fish relocation data collected across the north coast, and Program coordination requirements, NMFS expects any injury or death of listed species due to fish capture and relocation will be minimal. A CDFW analysis of data from two years of fish relocation activities in Humboldt County showed that mortality rates associated with individual fish relocation sites were less than 3% and the mean mortality rates for all sites was less than 1% (Collins 2004). Further, a NMFS (2012) review of all Fisheries Restoration Grant Program (FRGP) annual monitoring reports of dewatering and relocation activities for 99 projects across 8 years showed less than 1% of relocated steelhead perished. As described in the BA (CDFW 2022), if fish mortality exceeds 3% of the catch of any listed species during any particular fish relocation event, NMFS will be contacted. Sampling or fish relocation for that project may only resume with the approval of NMFS, after the cause of the mortality event is known and activities are modified as needed to reduce or eliminate its future occurrence.

Due to Program elements, including those in section 2.8 of the BA (CDFW 2022), NMFS expects fish relocated during project implementation will not suffer from lower habitat quality or reduced growth potential after they are moved. Specifically, each fish capture and relocation plan shall describe the extent to which the release site has similar water temperatures as the capture location, contains ample habitat for captured fish, and holds a low likelihood of fish reentering the work site or becoming impinged on any exclusion nets or screens.

Based on data from years of sampling at hundreds of locations under NMFS' 4(d) scientific research and monitoring program, NMFS expects the injury and mortality rate resulting from fish capture (for all methods) and handling to be 3% or less (WCRO-2020-03293).

The number of fish NMFS anticipates will be exposed each year to monitoring activities, the number that will be tagged, and the number expected to die are shown in Table 1. Fish observed during snorkel surveys will not be adversely affected and are therefore not included in Table 1.

Table 2 describes the maximum annual number of fish NMFS anticipates project implementers will be exposed to capture and relocation, and the number of fish expected to die from capture, relocation, crushing, and desiccation.

The Program requires anyone except CDFW collecting fish, including project implementers executing their required monitoring plans, to possess a current CDFW Scientific Collecting Permit (SCP). Further, if the project may result in harm or death of fish under CESA, a Memorandum of Understanding (MOU) must be enacted between CDFW and the project implementers prior to any collection of fish. These Program elements give NMFS confidence that any collectors will be fully qualified, and that the expected annual number of fish captured/collected, and injured or killed during these activities will not exceed that described in Tables 1 and 2.

2.5.1.6.4 Crushing

If in-water work occurs without dewatering a work area, any salmonids present are at risk of being killed by crushing injury from boots or heavy equipment. NMFS expects these salmonids to avoid sources of potential injury or death, but their ability to do so decreases if the amount of water in the work area is small, e.g., at low tide, or if there are a large volume of equipment and people in a small watered area that is not sufficiently connected to other aquatic zones to allow fish to escape. The likelihood of injury or death from crushing may be greater in tidal areas, because for some activities in these areas, such as excavating a channel in a slough, it may not be feasible to dewater the work area. In addition, in-water work in tidal areas typically occurs during a low or receding tide, which would tend to concentrate fish into a smaller area of water at the same time that the in-water work is happening, increasing the chance that fish will be under boots or heavy equipment. The number of fish expected to be crushed is included in Table 2.

2.5.1.6.5 Desiccation

Any individual fish that elude capture prior to dewatering will become stranded in dewatered work areas, where they are expected to die from desiccation. For dewatering projects occurring in tidal or estuarine areas, there is often a large volume of water, and due to poor existing habitat conditions at restoration sites a low number of listed fish are expected to present, reducing the effectiveness of fish detection for relocation and increasing the risk of desiccation. The number of fish expected to die from desiccation is included in Table 2.

2.5.1.6.6 Turbidity/sediment mobilization

All project types involving ground disturbance in or adjacent to streams have the potential to increase turbidity and suspended sediment levels within the project work site and for a short distance downstream. Activity in the channel, such as wading in the river to catch fish for monitoring, installing large wood structures, grading, or use of heavy equipment will mobilize fine sediment already present in the stream and result in turbidity. In addition, a small amount of sediment from the banks may be incidentally introduced into the channel at any Project site.

Short-term increases in turbidity and suspended sediment levels associated with construction may temporarily negatively impact fish survival and growth if they lead to reduced availability of food, reduced feeding efficiency, or reduced ability to see and avoid predators. Small pulses of turbid water can cause salmonids to temporarily move from their established territories into less suitable habitat, possibly increasing competition and predation if the new habitat is of lower quality. Due to low streamflow during the construction period, NMFS expects that any sediment suspended by instream activity would settle to the substrate and return to baseline conditions within 15 minutes to one hour after disturbance. This short duration may not disturb fish enough to abandon their original habitat. Any fish that move into nearby habitat to avoid turbidity are expected to quickly return to the original habitat once the initial disturbance of sediment is over, with negligible effects to their fitness.

Major work in the channel will include use of cofferdams to delineate an area to be dewatered. Fish between the cofferdams will be relocated to habitat nearby, and any sediment introduced during in-water work in the dewatered area will be contained by the cofferdams, preventing it from entering nearby habitat. Once in-water work is complete for the season, sediment within the dewatered area will be introduced to the stream and briefly mobilized when the cofferdams are removed and flow is restored to the reach.

Studies of sediment effects during culvert construction determined that increased sediment accumulation within the streambed was measurable (relative to control levels within) at a range of 358 to 1,442 meters downstream of the culvert (Lachance et al. 2008). Turbidity is therefore expected to extend as far as 1,500 feet downstream of work areas. In tidal areas, this turbidity is expected to clear each day when tides inundate the affected work areas; the incoming tide would generally carry suspended sediments inshore and upstream, until the tide reverses and the turbid water travels in the reverse direction, out of the work area. In freshwater areas, turbidity should decline rapidly once the source of disturbance stops; the volume of water in these areas is expected to stay the same or decline during the construction season, which ends before the rainy season begins. Without disturbance from increased flow, sediment suspended in the water column is expected to rapidly settle onto the stream substrate. Each project will be required to control erosion, cover exposed dirt piles, and revegetate disturbed soils, which NMFS expects will reduce the sediment entering the stream to a great degree. Most of any newly introduced sediment that settles on the stream substrate is expected to exit the system during winter storms with scouring flows.

NMFS expects that the adherence to required protection measures described in section 2.8 of the BA (CDFW 2022) and in the proposed action (section 1.3) will reduce the extent, severity, and duration of turbidity and reduce suspended sediment levels enough that the most severe effect would be a short-term reduction in feeding. NMFS does not expect these temporary effects to feeding to decrease the individual fitness of any listed fish.

2.5.1.6.7 Effects of underwater sound

Temporary behavioral changes that fish may exhibit in response to noise (e.g., from use of explosives or pile driving) include startling, altering behavioral displays, avoidance, displacement, and reduced feeding success. Observations of juvenile coho and steelhead exposed to underwater sound from pile driving noise above the 150 dB behavioral threshold at the Mad River Bridges Highway 101 project indicated that juvenile salmonids quickly habituate to sub-injurious noise and resume normal surface-feeding behavior within a few minutes of the fist pile strikes (Mike Kelly, NMFS, personal observations 2009, 2011). Therefore, NMFS believes that periodic behavioral changes caused by sub-injurious sound exposure will not result in decreased fitness or survival of individual juvenile salmonids.

Barotrauma, or physical injury due to changes in water pressure, will not occur as a result of in-water pile driving carried out under the Program. Most pile driving will be conducted in or adjacent to dry channels, eliminating potential for barotrauma. For pile driving in wetted areas, the In-Water Pile Driving Protection Measures described in the Proposed Action require each project to complete a hydroacoustic assessment and develop a pile driving plan to confirm that underwater sound pressure levels are expected to below the cSEL injury threshold criteria for peak pressure and accumulated sound exposure levels. The pile driving plan will identify the appropriate, site-specific attenuation, sound monitoring, dewatering, or fish relocation measures necessary to avoid injury and mortality. If, after this coordination, agency review of the resulting pile driving plan finds that cSEL levels will exceed the injury threshold levels, the project will require a separate Corps permit and individual ESA Section 7 consultation.

Where pile driving occurs in a wetted channel or floodplain, fish will be relocated to areas where sound levels are safe, as necessary. However, it may not be feasible to dewater some tidal areas sufficiently to detect and remove all juvenile salmonids. Where there is sufficient depth, hydrophones will be deployed in these areas to monitor water pressure and signal the need to stop activities prior to exceedance of pressure threshold levels (see section 1.1.4). In circumstances where the floodplain cannot be effectively dewatered, and water is too shallow to deploy hydrophones, even if attenuation measures are employed NMFS anticipates that some juvenile fish could be killed by barotrauma. In such a circumstance, similar to that described above, the project will require a separate Corps permit and individual ESA section 7 consultation.

2.5.1.6.8 Bio-engineered bank stabilization

While the bio-engineered bank stabilization methods carried out under the Program will benefit degraded salmonid habitat by manually improving riparian and streambank habitat, the achieved habitat quality and persistence may fall short of what could be achieved naturally through dynamic channel processes if unhampered by the bank stabilization. Because of the perpetual nature of most bank stabilization structures, any impacts experienced by species with typically short life-spans (3 years for coho salmon, typically 3-4 for Chinook salmon and steelhead) will likely manifest as a continued depression in juvenile carrying capacity at the site level.

However, as noted above, the proposed bio-engineering approach is expected to improve habitat conditions relative to what currently exists within the channelized action area. We expect substantially more juvenile fish will be able to successfully rear in these areas after bio-engineering bank stabilization improves habitat conditions. This improvement may not fully counter-balance the ongoing impact on habitat function and carrying capacity caused by extending channelization at that site into the foreseeable future, but instead compensates for it to a fair degree at the site level.

Translating this remaining impact into actual injury/death at the individual fish level is inherently difficult, given the indeterminate nature of future programmatic actions (e.g., project location, project technique, current onsite habitat quality, current population dynamics of impacted fish, etc.), which necessitates the use of a habitat-based proxy. The habitat proxy NMFS chose to estimate the extent of fish loss is the length of bio-engineered streambank restored per project (bio-engineered streambank length must be less than 3x the active channel width). Because these sites are very small relative to the stream area available to rearing juveniles throughout the action area, NMFS expects overall reductions in juvenile fish numbers due to bioengineering to be minimal.

2.5.1.9 Annual anticipated exposure estimates and mortality

The annual number of juvenile salmonids of each ESU/DPS that may be exposed to monitoring activities (capture, handling, tissue sampling, and PIT tagging), and the number of these that may be injured or die as a result, is shown in Table 1 (from proposed action section; reproduced for reference below).

Table 1: Annual exposure estimates of juvenile salmonids captured, handled, and tagged during project monitoring, and anticipated injury mortality response (reproduced from the biological opinion's proposed action section).

ESU/DPS	Maximum Number of Juveniles Captured and Handled	Maximum Number of Juveniles PIT tagged	Anticipated injury and mortality (3%)
SONCC coho salmon	2500	25	75
CCC coho salmon	500	50	15
CC Chinook salmon	30	10	1
NC steelhead	9000	900	270
CCC steelhead	1000	100	30
S-CCC steelhead	1000	100	30

The annual number of juvenile salmonids of each ESU/DPS that may be exposed to effects of capture and relocation prior to dewatering, to crushing, and to desiccation during project implementation, and the number of these that may die as a result, are shown in Table 2.

Table 2: Annual exposure estimates and anticipated injury and mortality response of juvenile salmonid species resulting from capture and relocation prior to dewatering, as well as crushing and desiccation.

	Juveniles per Year, per ESU/DPS					
	SONCC coho salmon	CCC coho salmon	CC Chinook salmon	NC steelhead	CCC steelhead	S-CCC steelhead
Maximum Number of Juveniles	1650	425	30	8850	1575	1575
3% Mortality	50	13	1	266	47	47

2.5.2 Effects to designated critical habitat

2.5.2.1 Effects of riparian and aquatic habitat disturbance

Effects of riparian vegetation disturbance on designated critical habitat are expected to be minor and temporary. In most cases, entire trees or shrubs in riparian areas that are part of a project footprint will be left in place and their branches or vegetation cut back to establish access. Where entire riparian plants must be removed (e.g., removal of a shrub to create access to place a large wood structure), NMFS expects the loss of riparian vegetation from any given project to be small, and limited to mostly shrubs and an occasional tree. Consistent with the Protection Measures, as much understory brush and as many trees as possible will be retained, to preserve shade and natural bank stabilization benefits. The plant species most likely to be cut back or removed (willows and other shrubs) will generally reestablish quickly (usually within one season). The required revegetation of disturbed riparian areas (and planting ratio of two new plants for each plant removed) described in the Protection Measures will further minimize the effect of any small, temporary loss of vegetation. As such removal of riparian vegetation will not normally remove aquatic habitat elements, any effects to fish are also expected to be minor and limited to temporary changes in shade (shade recovery within two years) and food availability (at former levels by the next spring or summer) until replanted vegetation is established.

NMFS also expects aquatic habitat disturbance to be minor, episodic, and temporary - generally limited to compression of substrate, aquatic plants, and benthic prey from trampling and heavy equipment operation, and disturbance of benthic prey during pile driving activities. Any affected aquatic vegetation and benthic prey are expected to repopulate quickly (within a season).

2.5.2.2 Toxic chemicals

Effects of toxic chemicals on designated critical habitat are expected to be minor and temporary given the extensive protection measures described in the Proposed Action, which should effectively limit or eliminate entry of these chemicals into stream courses. In addition, designated critical habitat would only be temporarily affected by any trace amount of chemicals that enter the water, because contaminants will be swiftly diluted and rapidly flushed from the system, either immediately or after fall rains arrive.

2.5.2.3 Turbidity, sediment mobilization, and deposition of sediment on aquatic substrate

Turbidity, sediment mobilization, and deposition of fine sediment on aquatic substrate may affect water quality and the food resources available for juvenile development, which are two physical and biological features (PBFs) of designated critical habitat for coho salmon, Chinook salmon, and steelhead. When sediment settles out the water column, it may obscure benthic (bottom dwelling) aquatic invertebrates, which may reduce salmonid feeding efficiency. However, the amount of sediment entering waterways from Project activities is expected to be small, given the protection measures and project requirements discussed above. This small amount is not expected to kill or harm benthic aquatic macroinvertebrate prey items or to alter their behavior. Effects to water quality and salmonid prey items are expected to be minor and temporary, lasting from an hour to perhaps a day at a time at any given project site.

2.5.2.4 Dewatering

Benthic aquatic macroinvertebrate populations will die when their habitat is dewatered. As these benthic organisms are part of the food web that provides prey to juvenile salmonids, dewatering will reduce the amount of prey available and temporarily adversely affect the PBF associated with prey resources. The extent of macroinvertebrate loss from any given project may be small because the size of the dewatered area is a small fraction of the total size of the stream systems they occur in, although the dewatered area may represent a larger portion of available summer rearing habitat in any given small stream or reach. These effects will end once in-water work is over each year. Once flow is restored to a dewatered zone, macroinvertebrates from nearby populations typically recolonize it within one to two months (Cushman 1985, Attrill and Thomas 1996, Harvey 1986).

2.5.2.5 Temporary loss of channel habitat and prey resources

Floodplain reconnection projects that involve channel fill for hydraulic reconnection (such as when re-grading floodplains, which involves skimming earth off higher areas and moving it into lower areas) will result in a temporary loss of habitat in the portion of the channel that is filled. Once fall rains arrive, the stream will establish a new stream channel nearby, so upstream and downstream migratory salmonid access should not be impaired. A similar physical volume of habitat as occurred in the original channel should form quickly in the new channel as fall rains scour new pools. Aquatic vegetation and benthic prey are expected to colonize the area quickly (within a season).

2.5.2.6 Preclusion of natural channel form and function

The Program includes use of bio-engineering techniques, including the planting of native plant materials, willow walls, willow siltation baffles, brush mattresses, and brush bundles. These techniques are intended to resist lateral erosion while improving riparian and aquatic habitat. Habitat improvements include increased stream shade, increased production of invertebrates, providing for future recruitment of large woody material to streams, and trapping and binding fine sediment to reestablish riparian areas. The Program's bio-engineering techniques use a minimal amount of hard materials (e.g., rock), and are not intended to include traditional hard engineering techniques. The design guidelines described in the BA (CDFW 2022) minimize the use of boulders and prevent the use of large amounts of rip rap or other hard materials to harden banks or prevent geomorphic processes of erosion from occurring. Further, the Program will not include projects that are merely protecting private property from bank erosion issues.

Bank stabilization, including that achieved through bio-engineering techniques, impacts the physical habitat in two general ways – by changing a dynamic, unrestrained stream that constantly evolves via hydrologic and geomorphic processes into a fixed, simplified channel, and by altering the physical land/water interface (i.e., streambank) that provides shelter, food, and other ecosystem benefits to juvenile salmonids. Unlike lining the entire streambank with rock riprap that results in a habitat interface lacking suitable juvenile fish habitat, the proposed bio-engineering methods will instead utilize natural material (e.g., live plantings, logs and root wads, boulders) to craft a streambank that will resist lateral erosion while providing complex rearing, feeding and sheltering habitat that is equivalent or better to than the streambank habitat already present. Replacement of poorly vegetated, eroding stream banks with bio-engineered stabilization and riparian planting will improve existing habitat at project sites, improving salmonid growth and survival.

Of greater concern than streambank habitat impacts is the long-term preclusion of natural fluvial and geomorphic processes resulting from bio-engineering when added to existing streambank stabilization in the action area. In most low gradient streams, the channel will naturally "meander", eroding laterally to dissipate its hydraulic energy while creating a sinuous longitudinal course. Meandering streams also create and maintain both the hydraulic and physical components of instream habitat used by fish and other aquatic species.

While the bio-engineered bank stabilization methods carried out under the Program will benefit degraded salmonid habitat by manually improving riparian and streambank habitat, the achieved habitat quality and persistence may fall short of what could be achieved naturally through dynamic channel processes if unhampered by the bank stabilization. Because of the perpetual nature of most bank stabilization structures, any impacts experienced by critical habitat will be long-term. However, as noted above, the proposed bio-engineering approach is expected to improve habitat conditions relative to what currently exists within those portions of the action area where these practices are implemented. This improvement may not fully counter-balance the ongoing impact on habitat function and carrying capacity caused by extending channelization at that site into the foreseeable future, but instead compensates for it to a fair degree at the site level. Remaining adverse effects to critical habitat will be minimal and limited to small site specific areas.

2.5.3 Benefits to species and their critical habitats

Degraded habitat was a major factor in the ESA listings of coho salmon, Chinook salmon, and steelhead throughout the action area, and it remains a major limitation on recovery of these species (Williams et al. 2016). All projects carried out under the Program are expressly designed to restore, enhance, or protect anadromous salmonid habitat. Habitat improvements support rebuilding of fish populations over time, because they enable improved growth and reproduction of individual fishes. In addition to creating new habitat or restoring existing habitat, most projects will also restart natural processes that create and maintain this habitat into the future. For example, placing a large habitat structure in a river provides fish with cover and habitat from the structure itself. In addition, when winter flows interact with the structure they will scour pools from the existing sediment nearby, and scour from flows each winter will maintain the pools over time. Water conservation projects are particularly critical, as they can relatively rapidly change the amount of water in the river, saving fish from death by desiccation as well as supporting their growth and development. Ongoing implementation of habitat restoration projects throughout the RGP-12 area has been and continues to be a major driver in regional recovery of these species (NMFS 2016a, NMFS 2016b, NMFS 2016c, NMFS 2016d, NMFS 2016e). The Program's wide geographic scope results in projects occurring each year in many watersheds important to species recovery, spreading the benefits of this restoration beyond a single watershed.

2.6 Cumulative Effects

"Cumulative effects" are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation [50 CFR 402.02 and 402.17(a)]. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Non-Federal activities that are reasonably certain to occur within the action area include those described in the environmental baseline and likely to continue into the future: agricultural practices, water withdrawals/diversions, mining, state or privately sponsored and funded habitat restoration activities on non-Federal lands and without Federal permit needs or funding, road work, timber harvest, and residential growth. NMFS assumes these activities, and similar resultant effects [as described in the Status of the Species (Section 2.2) and Environmental Baseline (Section 2.4) sections within this document] on listed salmonids will continue on an annual basis over time.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline vs. cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described earlier in the discussion of Environmental Baseline (Section 2.4).

2.7 Integration and Synthesis

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

The abundance of SONCC coho salmon, CCC coho salmon, CC Chinook salmon, NC steelhead, CCC steelhead, and S-CCC steelhead has declined from historic numbers. Nearly all populations of SONCC coho salmon are at a high risk of extinction, but SONCC coho salmon are still found in all major river basins within the ESU. The overall risk of extinction for the CCC coho salmon ESU is high due to low abundance, range constriction (especially in the south portion of the range), fragmentation, and loss of genetic diversity. CC Chinook salmon have a fragmented population structure, and the geographic distribution within the ESU has been reduced, particularly in southern and spring-run populations. Long-term population trends suggest that many populations of NC steelhead have a negative growth rate. CCC steelhead numbers are substantially reduced from historical levels. Populations of S-CCC steelhead throughout the DPS have exhibited a long-term negative trend since at least the mid-1960s. The most recent status review reaffirmed the endangered status of CCC coho salmon (NMFS 2016b) and the threatened status of SONCC coho salmon (NMS 2016a), CC Chinook salmon (NMFS 2016b), NC steelhead (NMFS 2016b), CCC steelhead (NMFS 2016c), and S-CCC steelhead (NMFS 2016e).

Habitat degradation has been a major factor in the decline of these species, and poor habitat conditions continue to limit their recovery potential. In addition to ongoing concerns such as fine sediment and poor water quality resulting from legacy land management practices, persistent drought conditions across the entire action area impact water quantity and result in juvenile mortality as well as suppression of fish growth. Actions to restore habitat make up the vast majority of needed actions identified in each species' recovery plan. As described in the status of species and cumulative effects sections, NMFS expects that ongoing Federal and non-Federal actions to support human activities will continue. Some of these activities are expected to incidentally harm these species or adversely affect their designated critical habitat (e.g., agricultural practices, water withdrawals/diversions, road work, and timber harvest). Habitat restoration activities sponsored by state, federal, and private entities, as well as regulatory changes, are expected to provide an overall benefit to these species and their habitat.

The Program will continue into the future and benefits from past Program restoration actions will continue to accrue as the Program continues. For example, increased access to good spawning habitat that results from a barrier remediation project that restores access to good spawning habitat will benefit spawners every year into the future. During each year of the proposed action, up to 4,150 SONCC coho salmon, 925 CCC coho salmon, 60 CC Chinook salmon, 17,850 NC steelhead, 2,570 CCC steelhead, and 2,570 S-CCC steelhead may be captured and handled (relocation, measuring, tagging) during execution of Program activities across the entire Action Area. The vast majority of these juvenile fish, as well as other fish exposed to other habitat changes associated with the program (e.g., temporary elevated turbidity, etc.) will avoid detrimental effects, aside from potential temporary behavioral impacts to feeding behavior. As noted earlier, these behavioral impacts will likely be negligible, given their short duration and sub-injurious nature. At most, NMFS estimates that 3% of these juvenile fish may be injured or killed as a result of Program relocation, measuring, and tagging activities each year, or up to 125 SONCC coho salmon, 28 CCC coho salmon, 2 CC Chinook salmon, 536 NC steelhead, 78 CCC steelhead, and 78 S-CCC steelhead.

NMFS also anticipates small losses of juvenile listed salmonids resulting from channelization of portions of streams using bio-engineering techniques. Because these sites are very small relative to the stream area available to rearing juveniles throughout the action area, NMFS expects overall reductions in juvenile fish numbers due to bioengineered stream channelization to be minimal.

Any mortalities from the Program will be spread across project locations within the extensive action area, which spans multiple diversity strata of each of the three-salmonid species. At most, 3% of the fish captured on any given day at any given project would perish, leaving the majority of the fish in any location to persist unharmed (e.g., of 30 coho salmon relocated at Creek x on Day y, perhaps one would die). Similarly, any losses in carrying capacity due to streambank stabilization are likely minor and limited to the site level. Thus, while the abundance of juveniles in any given location may be slightly reduced, these numbers would likely be insignificant at the population level. In addition, NMFS expects the distribution of juvenile fish across the action area to generally remain unchanged.

NMFS does not expect juvenile mortality resulting from Program activities to impact future adult returns for SONCC coho salmon, CCC coho salmon, CC Chinook salmon, NC steelhead, CCC steelhead or S-CCC steelhead. Juvenile salmonids rearing within the action area will tend to occur in areas with the best habitat, while the Program's restoration activities will focus on areas with poor habitat; therefore, many juvenile salmonids occurring throughout the action area would not be subjected to potential injury or death from construction activities associated with the Program's projects, because they won't be present where these activities are occurring. In NMFS' judgment, these juveniles, along with those occurring in construction areas that are not adversely affected by Program activities, are likely to result in enough future spawning adult fish to outweigh any losses resulting from relocation efforts within the action area.

Minor or temporary adverse effects to critical habitat are expected during construction of projects. Some Program activities may prevent lateral channel migration to some degree, which can limit the degree of habitat improvement possible on a site-specific basis. However, the use of native riparian plants and logs/rocks to retard or stop such channel migration will create essential components of ESA-listed salmonid critical habitat where they do not currently exist, or enhance critical habitat where it is already functional. Further, the requirement that the bioengineered streambank length must be less than 3 times the active channel width ensures that only a small portion of a stream would be stabilized during any Program project. Overall, NMFS expects the

Program will improve critical habitat by improving and enhancing a number of PBFs for all listed salmonids. NMFS expects this habitat improvement will improve the spawning and rearing success of subsequent generations, and so improve the distribution and abundance of SONCC coho salmon, CCC coho salmon, CC Chinook salmon, NC steelhead, CCC steelhead, and S-CCC steelhead across the action area over time.

Inland portions of the action area could be subject to higher average summer air temperatures and lower total precipitation levels due to climate change. Although the total precipitation levels may decrease, the average rainfall intensity has increased and is expected to continue to increase in the future. Higher inland air temperatures would likely warm associated stream temperatures. Reductions in the amount of precipitation would reduce stream flow levels and estuaries may also experience changes in productivity due to changes in freshwater flows, nutrient cycling, and sediment amounts. Much of the action area is in the coastal fog belt which is likely to ameliorate many climate impacts for the foreseeable future relative to inland areas. Because most Program activities will restore habitat-forming processes, NMFS expects it will help improve the resilience of species and habitats to climate change across the action area. Overall, the Program is unlikely to appreciably reduce the likelihood of survival and recovery of SONCC coho salmon, CCC coho salmon, CC Chinook salmon, NC steelhead, CCC steelhead, or S-CCC steelhead; further, the Program is unlikely to appreciably diminish the value of designated critical habitat to the conservation of these species.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and the cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of SONCC coho salmon, CCC coho salmon, CC Chinook salmon, NC steelhead, CCC steelhead or S-CCC steelhead, or destroy or adversely modify their designated critical habitat.

2.9 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Harass" is further defined by interim guidance as to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering." "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

The take exemption conferred by this incidental take statement is based upon the proposed action occurring as described in the biological opinion and in more detail in the Biological Assessment.

2.9.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

2.9.1.1 Annual anticipated exposure estimates and mortality

The annual number of juvenile salmonids of each ESU/DPS that may be exposed to monitoring activities and that may be exposed to adverse effects of project construction and monitoring activities, and of those the number that may die, are described in Table 1 and Table 2 are summarized below.

In each reporting year (January 1-December 31), NMFS anticipates up to 2,500 juvenile SONCC coho salmon may be captured and handled for monitoring each year, and up to 25 of these may also be PIT-tagged (Table 1). In addition, up to 1,650 juvenile SONCC coho salmon may be exposed to capture and relocation prior to dewatering, as well as crushing and desiccation (Table 2). Overall, NMFS estimates that up to 3% of these juveniles may be injured or killed during the identified Program activities each year, or 125 juvenile SONCC coho salmon.

In each reporting year, NMFS anticipates up to 500 juvenile CCC coho salmon may be captured and handled for monitoring each year, and up to 50 of these may also be PIT-tagged (Table 1). In addition, 425 juvenile CCC coho salmon may be exposed to capture and relocation prior to dewatering, as well as crushing and desiccation (Table 2). Overall, NMFS estimates that up to 3% of juveniles may be injured or killed during the identified Program activities each year, or 28 juvenile CCC coho salmon.

In each reporting year, NMFS anticipates up to 30 juvenile CC Chinook salmon may be captured and handled for monitoring each year, and up to 10 of these may also be PIT-tagged (Table 1). In addition, 30 juvenile CC Chinook salmon may be exposed to capture and relocation prior to dewatering, as well as crushing and desiccation (Table 2). Overall, NMFS estimates that up to 3% of juveniles may be injured or killed during the identified Program activities each year, or 2 juvenile CC Chinook salmon.

In each reporting year, NMFS anticipates up to 9,000 juvenile NC steelhead may be captured and handled for monitoring each year, and up to 900 of these may also be PIT-tagged (Table 1). In addition, up to 8,850 juvenile NC steelhead may be exposed to capture and relocation prior to dewatering, as well as crushing and desiccation (Table 2). Overall, NMFS estimates that up to 3% of juveniles may be injured or killed during the identified Program activities each year, or 536 juvenile NC steelhead.

In each reporting year, NMFS anticipates up to 1,000 juvenile CCC steelhead may be captured and handled for monitoring each year, and up to 100 of these may also be PIT-tagged (Table 1). In addition, up to 1,575 juvenile CCC steelhead may be exposed to capture and relocation prior to dewatering, as well as crushing and desiccation (Table 2). Overall, NMFS estimates that up to

3% of juveniles may be injured or killed during the identified Program activities each year, or 78 juvenile CCC steelhead.

In each reporting year, NMFS anticipates up to 1,000 juvenile S-CCC steelhead may be captured and handled for monitoring each year, and up to 100 of these may also be PIT-tagged (Table 1). In addition, up to 1,570 juvenile S-CCC steelhead may be exposed to capture and relocation prior to dewatering, as well as crushing and desiccation (Table 2). Overall, NMFS estimates that up to 3% of juveniles may be injured or killed during the identified Program activities each year, or 78 juvenile S-CCC steelhead.

NMFS also anticipates that listed salmonids will be adversely affected by channelization of portions of streams achieved using bio-engineering techniques. Quantifying the number of individuals lost from the harm caused by the proposed stream channelization is inherently difficult. Complex and variable components such as individual fish behavior and how that behavior adapts to changes in habitat, will primarily influence the number of fish in the action area that are harmed. In addition, finding dead individuals will be difficult due to their small size and the presence of scavengers. In such circumstances, NMFS cannot provide a precise amount of take that would be caused by the proposed action and instead uses one or more surrogates to estimate the extent of incidental take. NMFS will use the length of bio-engineered streambank constructed per project as a surrogate for the extent of incidental take resulting from channelization of streams using bio-engineering techniques. If the length of streambank bio-engineered by the Project is longer than the active channel width multiplied by 3, the extent of take will have been exceeded.

2.9.2 Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to species or destruction or adverse modification of critical habitat.

2.9.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of SONCC coho salmon, CCC coho salmon, CC Chinook salmon, NC steelhead, CCC steelhead, and S-CCC steelhead:

1. Minimize the amount or extent of incidental take of listed salmonids resulting from project implementation activities authorized by RGP-12.

2. Ensure that implementers of the restoration projects and monitoring activities authorized by RGP-12 will minimize take of listed salmonids, monitor and report take of listed salmonids, and where feasible, obtain specific project information to better assess the effects and benefits of restoration projects authorized through RGP-12.

2.9.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. The Corps or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1) The following terms and conditions implement reasonable and prudent measure 1: Minimize the amount or extent of incidental take of listed salmonids resulting from project implementation activities authorized by RGP-12.

    a) The Corps and/or CDFW shall contact NMFS within 48 hours if injuries or mortality at any restoration project or monitoring site on any given day exceed 3% of the number of captured fish for any listed species. Fish capture and/or relocation will cease at the project site until NMFS is contacted. NMFS will review the activities resulting in take and determine if modified methods or additional protective measures are required before fish handling at the site may resume.

2) The following terms and conditions implement reasonable and prudent measure 2: Ensure that implementers of the restoration projects and monitoring activities authorized by RGP-12 minimize, monitor, and report take of listed salmonids, and, where feasible, obtain specific project information to better assess the effects and benefits of restoration projects authorized through RGP-12.

    a) In addition to the information that will be provided in the annual notification to NMFS (described further in section 1.1.1.3 of the proposed action section), the Corps and/or CDFW shall describe the number of small dam projects per HUC-10, and the number of floodplain reconnection projects over 1,000 acres per HUC-10, across all projects authorized through RGP-12 for that year.

       The annual notification shall be submitted to the following three NMFS contacts no later than March 15:

       NMFS Northern California Office (Arcata):
       Jeffrey.Jahn@noaa.gov
       Julie.Weeder@noaa.gov
       NMFS North Central Coast Office (Santa Rosa)
       Erin.Seghesio@noaa.gov

    b) Throughout the reporting year, the Corps and/or CDFW shall track the take resulting from all implementation and monitoring activities carried out under the Program. If the total number of fish of any species killed during Program activities approaches or exceeds the number of fish identified in the ITS and listed in the last column of Table 1 or bottom row of Table 2, the Corps and/or CDFW shall immediately notify the South

Coast Branch Chief of the NMFS Northern California Office, Jeffrey Jahn, at 707-825-5173 or Jeffrey.Jahn@noaa.gov.

c) The annual report of the project and monitoring activities that occurred during the previous reporting year (January 1- December 31), which will include the information described in section 1.1.1.3 of the proposed action section, shall be submitted to the following three NMFS contacts no later than March 1 of each year: Jeffrey.Jahn@noaa.gov, Julie.Weeder@noaa.gov, and Erin.Seghesio@noaa.gov.

d) The Corps and/or CDFW shall coordinate with NMFS on an ongoing basis (at least twice per year) to review the results of implementation, effectiveness, and validation monitoring, modify how such monitoring is carried out by applicants and CDFW, and assess if these results suggest opportunities to reduce impacts on listed salmonids and their habitat, to advance restoration success, or both. This coordination shall occur through the SHARE team (described further in section 1.3.1 of the BA (CDFW 2022), or another approach mutually agreed upon by the Corps, CDFW, and NMFS.

2.10 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, "conservation recommendations" are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

NMFS has no ESA conservation recommendations for the Corps at this time.

2.11 Reinitiation of Consultation

This concludes formal consultation for the Corps' reissuance of RGP-12 to CDFW.

Under 50 CFR 402.16(a): "Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the agency 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 the biological opinion or written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action."

2.12 "Not Likely to Adversely Affect" Determinations

The ESA-listed threatened southern DPS of North American green sturgeon (*Acipenser medirostris*) and threatened southern DPS of Pacific eulachon (*Thaleichthys pacificus*) and their designated critical habitats occur within the action area. The Corps determined the proposed action may affect, but is not likely to adversely affect southern DPS green sturgeon, southern DPS eulachon or their critical habitats.

2.12.1 Southern DPS Green Sturgeon

Southern DPS green sturgeon inhabit estuaries along the west coast during the summer and fall months (Moser and Lindley 2007). The Southern DPS of North American green sturgeon primarily spawn in the deep turbulent sections of the upper reaches of the Sacramento River. As juvenile green sturgeon age, they migrate downstream and live in the lower San Francisco Bay delta and bay, spending from three to four years there before entering the ocean. Green sturgeon juveniles, subadults, and adults (pre-and post-spawning) are present in San Francisco Bay at various times throughout the entire year. Green sturgeon likely optimize their growth opportunities in summer by foraging in the relatively warm waters of estuaries (Moser and Lindley 2007). Green sturgeon forage on benthic prey items throughout the estuary, notably shallow tidal flats dominated by burrowing shrimp and other benthic prey items (Dumbauld et al. 2008). Sub-adults range from 65-150 cm total length from first ocean entry to size at sexual maturity. Sexually mature adults range from 150-250 cm total length.

Green sturgeon are also known to use the North Humboldt Bay heavily (Goldsworthy et. al. 2016, Pinnix 2008). Since juvenile southern DPS green sturgeon rear in their natal streams in upper reaches of the Sacramento River only sub-adult and adult Southern DPS green sturgeon are present in Humboldt Bay and are the only life stages of Southern DPS green sturgeon that could be exposed to the effects of the Project. Data collected by the USFWS indicate that green sturgeon are found more frequently in the North Bay portion of Humboldt Bay. Green sturgeon adults and subadults are temporary residents in Humboldt Bay from June through October, utilizing North Bay as summer-fall holding or feeding habitat, and the deeper waters of the North Bay Channel as a migratory corridor between the Pacific Ocean and Arcata Bay (Pinnix 2008). Green sturgeon are known to move rapidly within an estuary and travel within the top 6.5ft of a water column over deeper water at a speed of approximately 1.8ft per second. According to a study in the San Francisco Bay, green sturgeon that were near the surface of the water were also reported to swim in swift flowing regions of the bay, and were oriented in the direction of the current. The green sturgeon in Humboldt Bay will likely exhibit similar behavior and are expected to use the deeper waters of the Humboldt Bay Entrance Bay and the Humboldt Bay North Bay Channel for migration.

The Corps has determined that the proposed action may affect, but is not likely to adversely affect, southern DPS green sturgeon and its designated critical habitat (CDFW 2022). Green sturgeon in San Francisco Bay are outside the action area and will not be affected by the Program. Low numbers of adult southern DPS green sturgeon may be present at or near project sites within Humboldt Bay and could be exposed to brief periods of turbidity or acoustic noise during the high tidal cycles when they have access to the action area. The turbidity related to construction activities and dredging within the estuary is expected to be brief and acoustic noise is expected to be well below levels that cause any effects other than behavioral changes. Any minor increases in sediment and turbidity that convey to the estuary environment from tributaries will quickly dissipate within the larger spatial area of the receiving water body. Green sturgeon are benthic feeders typically accustomed to turbidity in their feeding environment, so temporary increases in turbidity within the estuary are not expected to reduce feeding opportunities for green sturgeon. The majority of southern DPS green sturgeon are found in the North Bay and Entrance Bay, and most will not be exposed to possible effects to benthic food resources where impacts to the substrate may occur. Because prey resources will only be temporarily affected, and there is ample suitable habitat elsewhere, we do not expect any fitness related consequences to individuals.

Migratory corridors for southern DPS green sturgeon may also be temporarily affected by increases in turbidity. However, turbidity is unlikely to significantly affect southern DPS green sturgeon migratory behaviors as the species has reduced eyesight and relies on other senses to navigate. The action is not expected to have more than negligible effects on temperature, salinity, or dissolved oxygen. Minimization measures are likely to avoid introducing significant amounts of contaminants (fuel, etc.) into the action area. Such toxics would be further diluted by tides and currents.

As described above, the proposed action is not expected to have more than minor impacts to the physical, chemical, and biological features of critical habitat for the southern DPS of green sturgeon in the action area. Similarly, for the reasons described above, the effects of the proposed action on southern DPS green sturgeon individuals in the action area are considered insignificant. Therefore, we concur that the proposed action is not likely to adversely affect the SDPS green sturgeon or its critical habitat.

2.12.2 Southern DPS of Pacific eulachon

The southern DPS of Pacific eulachon (*Thaleichthys pacificus*) is listed as threatened under the Endangered Species Act (50 CFR 223.102(e)). Fish from the Southern DPS of Pacific eulachon may be within the action area in the Lower Klamath River, Redwood Creek, and Mad River and their estuaries during certain times of the year. The peak spawning entry of eulachon into river systems is typically during February and March (75 FR 13012), and Larson and Belchik (1998) noted that spawning migrations of eulachon have been found in the Lower Klamath River as early as December and as late as May. Newly hatched larvae are immediately washed downstream after hatching a few weeks after spawning (Moyle 2002). CDFW does not expect eulachon will be present during restoration project implementation due the work windows (June 15 - November 1) not coinciding with when adult and juvenile eulachon will be in the action area (winter - spring). CDFW also does not expect eulachon will be encountered while performing effectiveness monitoring at other times of year due to past monitoring results. NMFS agrees that no life stages of eulachon are expected to be present in the action area during the construction season between June 15 and November 1, that encountering eulachon during monitoring activities is extremely unlikely, and that therefore all of the effects of the Proposed Action would be discountable for individual eulachon.

The PBFs for southern DPS eulachon critical habitat are: (1) freshwater spawning and incubation sites with water flow, quality and temperature conditions and substrate supporting spawning and incubation, (2) freshwater and estuarine migration corridors free of obstruction and with water flow, quality and temperature conditions supporting larval and adult mobility, and with abundant prey items supporting larval feeding after the yolk sac is depleted, and (3) nearshore and offshore marine foraging habitat with water quality and available prey, supporting juveniles and adult survival (50 CFR 226.222(b)). The proposed action has the potential to affect the first two PBFs of southern DPS eulachon critical habitat, which relate to freshwater spawning and incubation sites and freshwater migration corridors in the action area. The potentially affected components of the freshwater and estuarine PBFs include substrate, water quality, passage, and forage.

While the proposed in-stream portions of the proposed action could disturb areas of potential spawning substrate, the streambed would return to a natural condition after the first few heavy rains of winter. Adult eulachon would not likely spawn in the location until after this time; therefore, disturbance to spawning substrate would be temporary and insignificant. Increases in turbidity during the first heavy winter rains would be short and of low magnitude, representing a small percentage of overall turbidity compared to background levels, and are not expected to decrease the quality of downstream spawning and rearing habitat or effect prey in any measurable way. These potential impacts to critical habitat will not be sustained long enough, or occur at sufficient intensity, to adversely affect downstream adult spawning, migration corridors, or juvenile rearing habitat.

Based on these analyses, NMFS concurs with Corp's determination that the proposed action is not likely to adversely affect southern DPS eulachon and their critical habitat.

3.0 MAGNUSON–STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect Essential Fish Habitat (EFH). Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH [CFR 600.905(b)].

This analysis is based, in part, on the EFH assessment provided by the Corps and the descriptions of EFH for Pacific Coast Salmon (Salmon) (PFMC 2016), Pacific Coast Groundfish (Groundfish) (PFMC 2019a), and Coastal Pelagic Species (Pelagics) (PFMC 2019b) contained in the fishery management plans (FMPs) developed by the Pacific Fishery Management Council (PFMC) and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

Essential Fish Habitat is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (16 U.S.C. 1802[10]). “Waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” means habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers a species’ full life cycle (50 CFR 600.10). The term “adverse effect” means any impacts which reduce the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrates and loss of, or injury to, benthic organisms, prey species, and their habitats, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of it and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.910). The EFH consultation mandate applies to all species managed under a Fishery Management Plan (FMP) that may be present in the action area.

The Salmon, Groundfish, and Pelagics FMPs describe EFH that will be adversely affected by the Project. Furthermore, the action area is part of designated Habitat Areas of Particular Concern (HAPCs) for federally managed fish species under the Salmon FMP and the Groundfish FMP. HAPCs are described in the regulations as subsets of EFH that are identified based on one or more of the following considerations: the importance of the ecological function provided by the habitat; the extent to which the habitat is sensitive to human-induced environmental degradation; whether, and to what extent, development activities are, or will be stressing the habitat type; and the rarity of the habitat type (50 CFR 600.815(a)(8)). Designated HAPCs are not afforded any additional regulatory protection under MSA; however, federal projects with potential adverse impacts to HAPCs are more carefully scrutinized during the consultation process. The action area includes all of the HAPCs designated for the Salmon fishery: Complex Channel and Floodplain Habitat, Thermal Refugia, Spawning Habitat, Estuaries, and Marine and Estuarine Submerged Aquatic Vegetation. It also includes two Groundfish HAPCs: Estuaries and Seagrass.

3.2 Adverse Effects on Essential Fish Habitat

Coho salmon and Chinook salmon are expected to occur seasonally within the action area. The Program’s effects on salmon EFH are very similar to effects on coho salmon and Chinook salmon critical habitat, which are described in the effects section (2.5). The adverse effects to EFH for managed species in the Salmon FMP, Groundfish FMP, and Pelagics FMP, as well as to the HAPCs for salmon and groundfish species, are described below.

Temporary effects of construction, including dewatering, pile driving, and water quality degradation from sedimentation and turbidity, will cause adverse effects to EFH for all three FMPs. These construction activities will adversely affect the salmon HAPCs for Complex Channel and Floodplain Habitat, Estuaries, and Submerged Aquatic Vegetation, and the Estuaries and Seagrasses HAPCs for groundfish. In addition, small portions of salmonid EFH, although improved by bioengineering work to stabilize channels, will still suffer some long-term loss of habitat value as described above in the biological opinion's effects section.

The Program includes components that may disrupt, harm, or kill prey items for MSA-managed species, including the likely disruption and potential death of aquatic macroinvertebrates and MSA-managed fish species (such as northern anchovies and krill) when EFH is subjected to heavy equipment work or pile driving and prey items desiccate or suffer crushing injury.

3.3 Essential Fish Habitat Conservation Recommendations

Many of the adverse effects from the proposed action are temporary, as water quality and other disturbances will subside and improve over time. There may also be short-term reductions in eelgrass parameters shortly after each year's construction period, but eelgrass parameters are expected to begin to improve upon restoration of the tidal prism. Disruption, injury, and death of prey items will temporarily reduce the quality and quantity of EFH in the action area and interrupt the ability of EFH to provide the habitat needed for species to grow to maturity. Overall, the Program will improve and enhance the quantity and quality of EFH in the action area. NMFS did not identify any Conservation Recommendations for the Program.

3.4 Supplemental Consultation

The Corps must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations [50 CFR 600.920(l)].

4.0 Data Quality Act Documentation and Pre-Dissemination Review

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended user of this opinion is the US Army Corps of Engineers. Other interested users include CDFW and entities implementing restoration projects under RGP-12, citizens of affected areas, and others interested in the conservation of the affected ESUs/DPSs. Individual copies of this opinion were provided to the US Army Corps of Engineers and CDFW. The document will be available within 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adhere to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,’ Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR part 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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