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

May 5, 2022 **Refer to NMFS No:** WCRO-2021-01552

James Mazza
Regulatory Division Chief
U.S. Army Corps of Engineers, San Francisco District
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 Renewal of Regional General Permit 13 for the Santa Cruz Countywide Partners in Restoration Permit Coordination Program (Corps File No. 2003-275640)

Dear James Mazza:

Thank you for your letter of April 19, 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 renewal of Regional General Permit 13 for Santa Cruz Countywide Partners in Restoration Permit Coordination Program (Program).

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)) for this action.

In the enclosed biological opinion, NMFS concludes the Program is not likely to jeopardize the continued existence of endangered Central California Coast (CCC) coho salmon, threatened CCC steelhead, or threatened South-Central California Coast (S-CCC) steelhead, nor is the Program likely to result in the destruction or adverse modification of critical habitat for CCC coho salmon, CCC steelhead, or S-CCC steelhead. However, NMFS anticipates take of CCC steelhead, S-CCC steelhead, and CCC coho salmon will occur due to Program construction and maintenance. An incidental take statement with terms and conditions is included with the enclosed biological opinion.

Regarding EFH, NMFS has reviewed the proposed project for potential effects and determined that the proposed project would adversely affect EFH for coho salmon managed under the Pacific Coast Salmon Fishery Management Plan (FMP). However, the anticipated effects are minor, temporary, or localized. Therefore, we have no practical EFH Conservation Recommendations to provide and no EFH Conservation Recommendations are included in this document.

Please contact William Stevens, North-Central Coast Office in Santa Rosa, at (707) 575-6066 or William.Stevens@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: Frances Malamud-Roam, Corps San Francisco District,
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Kelli Camara, Santa Cruz County RCD, kcamara@rcdsantacruz.org
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Copy to ARN File # 151422WCR2022SR00097

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

Renewal of Regional General Permit 13 for the
Santa Cruz Countywide Partners in Restoration Coordination Program
NMFS Consultation Number: WCRO-2021-01552
Action Agency: U. S. Army Corps of Engineers, Regulatory Division, San Francisco District

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?
Central California Coast steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	Yes	No
South-Central California Coast steelhead (*O. mykiss*)	Threatened	Yes	No	Yes	No
Central California Coast coho salmon (*O. kisutch*)	Endangered	Yes	No	Yes	No

Essential Fish Habitat and NMFS' Determinations:

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

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

Issued By:

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Date: May 5, 2022

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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 NMFS' North-Central California Coast Office in Santa Rosa, California.

1.2 Consultation History

On May 31, 2005, NMFS issued a biological and conference opinion to the U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS) for the funding and carrying out of the Partners in Restoration Permit Coordination Program in partnership with the Santa Cruz County Resource Conservation District. This program was to be in effect for five years (2005-2009). On July 18, 2006, NMFS issued an amended biological opinion to the NRCS for the funding and carrying out of the Partners in Restoration Permit Coordination Program in partnership with the Santa Cruz County Resource Conservation District. The biological opinion was amended to: 1) confirm the conference on steelhead critical habitat as part of the biological opinion; 2) consider the recent listing change for Central California Coast coho salmon from threatened to endangered; and 3) incorporate changes to the project description related to financial assurances. The 2006 amended biological opinion replaced the 2005 biological and conference opinion. This program was in effect for four years (2006-2009).

On March 8, 2012, NMFS issued a biological opinion to the U. S. Army Corps of Engineers, Regulatory Division, San Francisco District (Corps) for the issuance of Regional General Permit 13 (RGP 13) to the Resource Conservation District (RCD) of Santa Cruz for the Santa Cruz Countywide Partners in Restoration Permit Coordination Program (Program, NMFS 2012). RGP 13 expired on December 31, 2021. Prior to the issuance of this biological opinion, NRCS determined they will not be overseeing the Program anymore as all responsibilities have been assumed by the Corps and the RCD. NRCS will continue to provide technical assistance to the RCD during the lifetime of the Program.

On April 19, 2021, the Corps requested initiation of consultation with NMFS pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for renewal of RGP 13 for the Program. In their April 19, 2021 letter, the Corps also requested that NMFS append the Program to our programmatic biological opinion we issued to the NOAA Restoration Center (NOAA RC) on June 14, 2016. This request lead to additional requests from NMFS for more information from the Corps (i.e., April 23, 2021, May 21, 2021, and July 8, 2021). Through discussions with the NOAA RC, the Corps, and NMFS, NMFS determined "appending" the Program to the NOAA RC programmatic biological opinion was not a feasible option. On July 15, 2021, NMFS determined the information provided by the Corps on July 15, 2021 was sufficient to initiate formal consultation.

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).

The Corps proposes to renew the 10-year RGP 13 for the Program to the Santa Cruz County RCD under Section 404 of the Clean Water Act (33 U.S.C.1344). The purpose of the proposed action is to continue to authorize the implementation and maintenance of 15 identified conservation practices in Santa Cruz County, California that improve water quality and wildlife habitat (Table 1). The RCD has a renewed emphasis on fish passage impediment removal projects and continued emphasis on projects that focus on increasing fish survival through improving channel complexity and watershed condition (with an emphasis on floodplain restoration, channel complexity, upslope sediment control in key watersheds, etc. and continued large wood projects through on-site tree use to promote forest health, reduce cost, and minimize impact). The Program's activities would be authorized to occur in all areas of Santa Cruz County, California.

The renewed RGP would authorize minor structures or work, including discharges of dredged or fill material, in waters of the U.S., to implement projects by landowners in Santa Cruz County participating in the Program. The Program would consist of the same 15 restoration and conservation practices as previously authorized (and described below). Corps-regulated structures and work in streams would be designed in accordance with the California Salmonid Stream Habitat Restoration Manual, Third Edition, January 1998, as revised, and would include: structures for bed and bank stabilization; willow sprigging; removal of obstructions to fish passage; embedded culverts; culvert replacements and improvements; riparian vegetation; and activities associated with upslope restoration of roads, eroded hillsides, and other areas contributing excess sediment to aquatic habitats. The RCD expects that in instances where proposed activities exceed the RCD's program conditions that the Corps would request a stand-alone consultation if the proposed activities may affect listed species, designated critical habitat, or both.

The renewed RGP would be structured the same as was analyzed in the 2012 biological opinion, with a three-tiered system for the standardized protection measures to be applied on level of impact expected for each project, as summarized later in this biological opinion.

1.3.1 The Program's 15 Conservation Practices

Table 1. Practice Descriptions and Maximum Size of the Practice Installed

Practice Name (NRCS Field Office Technical Guide Practice Code)	Practice Descriptions and Maximum Size of the Practice Installed (and additional limitations)
1. ***Access Roads (Improvement) (560)***[1]	Improvement of an existing road to provide access for property management while controlling runoff to prevent erosion and maintain or improve water quality. An example of this practice might include re-grading, outsloping, or the addition of a rolling dip to a road so that water is less erosive as it travels across the road. This practice may also be used for repair, removal, or addition of culverts. Ditch relief culverts that discharge onto slopes over 30% require additional measures. This practice is used only on existing roads. An example of practices from the California Department of Fish and Game, California Salmonid Stream Habitat Restoration Manual that could be utilized during implementation of the Access Road (Improvement) practice is Waterbars (p. VII-96). Length: Average: 1,000 linear feet (ft) of work spread out over 2 miles; Max: 10,000 linear ft of work spread out over 12 miles. Width: Average: 30 ft; Max: 30ft. Area: Average: 0.8 acres; Max: 4.5 acres. Volume[2]: Average: 750 cubic yards (cy); Max: 7,500 cy (or 1,000 cy in Coastal Zone Scenic Areas).

[1]Access road improvements typically involve multiple installations spread out over a long reach of road. Maximum dimensions refer to actual area of improvement.
[2]Volume of soil disturbed, based on practice installation and representing the volume of soil excavated and used as fill or removed from site, or soil imported as fill.

Practice Name (NRCS Field Office Technical Guide Practice Code)	Practice Descriptions and Maximum Size of the Practice Installed (and additional limitations)
2. ***Planting (342, 612, 422, 391)***	Planting vegetation such as trees, shrubs, vines, grasses, or legumes, for resource improvement. These practices can be used on eroding areas, to stabilize the soil, reduce damage from sediment and runoff to downstream areas, and improve wildlife habitat and visual resources. Common uses for Critical Area Planting (342) practice: To protect exposed soil area in agricultural ditches, and to revegetate gullies, roadway edges or farm roads, or exposed slopes or streambanks. Common uses for Hedgerow (442) practice: To provide food, cover and corridors for wildlife and provide insectary benefits that may reduce reliance on synthetic chemicals adjacent to agricultural fields, access roads and watercourses. Common uses for Tree/Shrub Establishment (612) and Riparian Forest Buffer (391) practices: To improve riparian habitat for aquatic species by creating shade to lower water temperature, provide a source of detritus and large woody debris, establish wildlife corridors, prevent against erosion within the floodplain, and provide for long-term water quality improvements. Area: Average: 1.0 acre; Max: 5 acres. Volume: Average: 700 cy; Max: 1,000 cy.
3. Stream Habitat Improvement and Management (395)	Improvement of a stream channel to create new fish habitat or to enhance existing habitat. This practice is used to improve or enhance aquatic habitat for fish in degraded streams, channels, and ditches by providing shade, controlling sediment, and restoring pool and riffle stream characteristics. Pools and riffles are formed in degraded stream

Practice Name (NRCS Field Office Technical Guide Practice Code)	Practice Descriptions and Maximum Size of the Practice Installed (and additional limitations)
	sections through the strategic placement of logs, root wads, or natural rocks to reduce flow velocity through the area. Coarse-grained sediments settle, reducing the quantity of sediment delivered downstream. The dissolved oxygen content may be increased, improving the stream's assimilative capacity. This practice may also be used for removal or modification of fish barriers, such as flashboard dams. The modification of flashboard dams may involve cutting a notch in the dam to allow for fish passage. Proposed modification of dam sites where long-term continuation of a dam or resumption of dam operation is contemplated, and where Lake and Streambed Alteration Agreements (from CDFW) are not already in place, will not be eligible for inclusion in the Permit Coordination Program without special approval from the local CDFW Environmental Scientist or staff person in charge of 1602 agreement review. In this situation, if NMFS does not agree with inclusion into the program, individual consultation would be required. Complete removal of flashboard dams is allowed under the program. This practice may be used to remove culverts that pose barriers to fish passage. This practice may also be used to remove hardened crossings that pose barriers to salmonid passage, such as culverts and simple fords that do not have complicated resource issues. This practice may be used up to two times per year for the modification or removal of logjams that present a complete barrier to all life stages of anadromous fish passage. If the

Practice Name (NRCS Field Office Technical Guide Practice Code)	Practice Descriptions and Maximum Size of the Practice Installed (and additional limitations)
	logjam does not act as a complete barrier, logjam removal may be implemented no more than two times annually under the program, but only if the following circumstance exists: In situations where water is actively or potentially deflecting water to a bank, threatening further erosion, bank failure, destruction of conservation practices installed to stabilize the bank, or threatening damage to life and housing, the logjam may be modified to minimize this threat. Efforts will be made to avoid "bucking" of wood and large pieces removed during modification will, if possible, be left in-channel downstream of the jam. Maximum Length: Modification of multiple structures at multiple bank locations within a 1-mile reach. Maximum dimensions for a logjam to be modified: 30 ft by 50 ft (across channel). Maximum dimensions for a flashboard dam to be modified or removed: 30 ft by 60 ft (across channel). Maximum dimensions for hardened crossings (fords) to be removed: 20 ft by 100 ft (across channel). Maximum area to be dewatered will not exceed 1,000 feet.
4. Stream Crossing (578)	This practice would be used to provide access on a site where an in-stream barrier to fish passage has been removed (e.g., installing a bridge where a culvert has been removed). If a culvert or ford has been removed, a bridge or other suitable crossing that is protective of fish passage (where salmonids occur) and water quality may be installed. Maximum dimensions for hardened crossings (fords) to be replaced: 20 ft by 100 ft (across channel).

Practice Name (NRCS Field Office Technical Guide Practice Code)	Practice Descriptions and Maximum Size of the Practice Installed (and additional limitations)
	Maximum bridge size to be installed: 100 ft (across stream) with 20 ft wide deck. The County of Santa Cruz prefers bridges have a 20 ft wide deck to accommodate emergency vehicles. However, most bridges installed under the permit coordination program would not likely exceed 16 ft in width.
5. Grade Stabilization Structure (410)	Installation of a structure built into a gully to control the grade and prevent head cutting in natural or artificial channels. This practice will not be installed in fish bearing streams and would primarily be used for gully repair. This practice refers to rock, timber, or vegetative structures, such as a brush mattress, placed to slow water velocities above and below the structure, resulting in reduced erosion. This practice also involves earthmoving to reshape the area impacted by the gully. This will decrease the yield of sediment and sediment-attached substances and improve downstream water quality. An example of a practice from the CDFW California Salmonid Stream Habitat Restoration Manual that could be utilized during implementation of the Grade Stabilization practice is Brush Mattressing (p. VII-79). Length: Average: 3 to 4 structures per 500 ft of gully, Max: 10 structures per 1,000 ft of gully. Area: Average: 0.5 acres; Max: 1.5 acres. Volume: Max: 30 cy per structure; 300 cy total. Flow Rate: Max: 300 cubic feet per second (cfs) in the pipe.
6. Grassed Waterway (412)	Establishment of a natural or constructed channel in uplands that is shaped or graded to required dimensions and expected velocities, and establishment of suitable vegetation for the stable conveyance of runoff. This practice

Practice Name (NRCS Field Office Technical Guide Practice Code)	Practice Descriptions and Maximum Size of the Practice Installed (and additional limitations)
	may reduce the erosion in a concentrated flow area, such as a gully. This may result in the reduction of sediment and substances delivered to receiving waters. Vegetation may act as a filter in removing some of the sediment delivered to the waterway, although this is not typically the primary function of a grassed waterway. Grassed waterways may be used to reduce the erosive force of runoff from agricultural lands into riparian or wetland areas or into a sediment basin. Length: Average: 1,000 ft; Max: 2,000 ft. Width: Average: 20 ft; Max: 40 ft. Area: Average: 0.5 acre; Max: 2 acre. Volume: Average: 1,000 cy; Max: 4,500 cy (or 1,000 cy in Coastal Zone Scenic Areas). Flow Rate: Max: 150 cfs.
7. Obstruction Removal (500)	Removal and disposal of unwanted structures from waterways and/or other sensitive habitats, including cars, large appliances, and garbage (items that are anthropogenic and not natural to the system). Large objects such as cars and appliances would be removed unless their removal would result in a (net) detrimental effect. For example, cars—which would have been be cabled when originally installed—will not be removed if the action would result in disturbance to an area beyond the maximum size identified for this practice or if the removal would cause erosion in quantities deleterious to fish or other aquatic organisms. Structures would be removed when the stream channel is dry or during the lowest flows to minimize impacts. This practice is used sparingly. Length: Max: 50 ft[3]. Area: Average: 10 ft x 15 ft; Max: 0.2 acre.

[3]Actual objects rarely exceed 10 ft. x 15 ft. Access to an object may involve disturbance of up to 50' in length. It is difficult to estimate the total number of separate objects to be removed from a stream and/or other locations. Maximum disturbance per project is limited to 0.2 acres.

Practice Name (NRCS Field Office Technical Guide Practice Code)	Practice Descriptions and Maximum Size of the Practice Installed (and additional limitations)
8. Restoration and Management of Rare and Declining Habitats (643)	Restoring and conserving rare or declining native vegetated communities and associated wildlife species. This practice is used to restore land or aquatic habitats degraded by human activity; provide habitat for rare and declining wildlife species by restoring and conserving native plant communities; increase native plant community diversity; and manage unique or declining native habitats. This practice may be used to remove invasive plant species in sensitive resource areas to improve the quality of the adjacent aquatic habitat or to manage non-native habitats that provide critical habitat for special status species, such as the monarch butterfly. This practice may also be used to manage fuel loads in sensitive habitats and allows treatment and maintenance of invasive species and noxious weeds, as well as revegetation of a treated area. Length: Average: 500 ft; Max: 1 mile. Area: Average: 1 acre; Max: 5 acres. Volume: Average: 50 cy; Max: 1000 cy.
9. Sediment Basins (350) [with or without water control (638)]	Construction of basin(s) to collect and store debris or sediment. Sediment basins will trap sediment, sediment associated materials, and other debris and prevent undesirable deposition on bottomlands and in waterways and streams. Basins are generally located at the base of agricultural lands adjacent to natural drainage or riparian areas. Sediment basins shall not be constructed in a historic stream channel or other water of the state, including riparian areas. This practice may also involve designing the sediment basin to control water volumes leaving a site and releasing the water at a natural flow rate. If water control were recommended, an earth embankment or a combination ridge and channel design constructed across the slope

Practice Name (NRCS Field Office Technical Guide Practice Code)	Practice Descriptions and Maximum Size of the Practice Installed (and additional limitations)
	and minor watercourses would be implemented to form a sediment trap and water detention basin. The practice does not treat the source of sediment but provides a barrier to reduce degradation of surface water downstream. Due to the detention of runoff in the basin, there is an increased opportunity for soluble materials to be leached toward the groundwater. Basins may also increase groundwater recharge. The design of spillways and outlet works will include water control structures to prevent scouring at discharge point into natural drainage. Area: Average: 0.1 acre; Max: 1.0 acre. Volume: Average: 400 cy; Max: 4,000 cy (compacted embankment); (or 1,000 cy in Coastal Zone Scenic Areas). Impoundment Volume: Average: 0.5 acre-foot; Max: 2 acre-feet. Impoundment Structure[4]: Average: 6 ft embankment measured from the lowest point in the basin to the spillway at a 2:1 maximum slope; Max: 6 ft – 10 ft embankment measured from the lowest point in the basin to the spillway at a 2:1 maximum slope.
10. Stream bank Protection (580)	This practice is intended to reduce the amount of sediment and pollution delivered downstream, improve habitat for fish and wildlife, and protect adjacent land from erosion damage. This practice would be applied to natural or excavated channels where stream banks are susceptible to damage from erosion, livestock, or vehicular traffic. This practice will use vegetation or structures to stabilize and protect banks of streams, lakes, or estuaries against scour and erosion.

[4] Embankment heights exceeding 6 ft will be accompanied by additional technical information that has been reviewed and approved by County Geologist and County Civil Engineer. All engineered practices will be designed to meet the minimum of a 10-year storm event.

Practice Name (NRCS Field Office Technical Guide Practice Code)	Practice Descriptions and Maximum Size of the Practice Installed (and additional limitations)
	The stabilization of waterbodies to avoid loss of a foot trail or unpaved road with hardscape when there is room to move the trail and or road is prohibited. “Bioengineered” solutions using vegetation and soft materials (as opposed to concrete and riprap, for example) are the preferred options where conditions are favorable for their use. The banks of streams and waterbodies are protected by vegetation to reduce sediment loads causing downstream damage and pollution and to improve the stream for fish and wildlife habitat as well as protect adjacent land from erosion damage. Examples of this practice may include willow sprigging, brush mattressing, live vegetative crib walls, and installation of root wads. Applications of riprap require backfilling with soil and planting with in-kind native vegetation. Large wood or other habitat features will be added if and when riprap is installed. A gravel filter is the preferred backing for the application of riprap. If the Permittee would like to use a geotextile layer, the Permittee will have to demonstrate why a gravel filter layer is infeasible. This practice can be applied to natural or excavated channels where the stream banks are susceptible to erosion from the action of water or debris or to damage from livestock or vehicular traffic. The streambed grade must be controlled, impacts (such as livestock and vehicles) controlled to the greatest extent feasible, and culverts sized correctly before most permanent types of bank protection can be considered feasible. Some examples of practices from the California Department of Fish and Game’s California Salmonid Stream

Practice Name (NRCS Field Office Technical Guide Practice Code)	Practice Descriptions and Maximum Size of the Practice Installed (and additional limitations)
	Habitat Restoration Manual that could be utilized during implementation of the Streambank Protection practice include Log Cribbing (p. VII-68), Live Vegetative Crib Wall (p. VII-69), Logbank Armor (p. VII-70), Riprap (p. VII-65), Native Material Revetment (p. VII-75), Willow Sprigging (p. VII-77), Brush Mattressing (p. VII-77), and Trenching (p. VII-80). Length: Vegetation Average: 200 ft; Vegetation Max: 2,000 ft. Rock Max: 200 ft contiguous rock protection and 500 ft of non-contiguous protection over 2,000 ft of bank. Width: Vegetation Average: 20 ft; Vegetation Max: 50 ft; Rock Average: 4 ft; Rock Max: 15 ft. Area: Average Vegetation: 0.1 acre; Max Vegetation: 2.5 acre; Rock Protection Max: 0.1 acre Volume: Average Vegetation: 500 cy; Max Vegetation: 4,000 cy[5] (or 1,000 cy in Coastal Zone Scenic Areas). Average Rock: 100 cy; Max Rock[6]: 800 cy. Flow Rate: Vegetation Max: 2,000 cfs instream.
11. Stream Channel Stabilization (584)	Stream channel stabilization entails stabilization of the channel of a stream with suitable structures. This practice would consist of designing and installing grade control structures to stabilize a streambed and encourage the growth of riparian vegetation. This practice would be applied to stream channels undergoing aggradation (sedimentation) or degradation (scour) that

[5] For vegetation treatments, soil disturbance is assumed to be a maximum of 700' of 2,000' maximum reach. The average depth of soil grading (cut or fill) is 3'.
[6] Numbers provided for rock armoring refer to actual areas and volume of rock placed only. Total soil disturbance limits are same as for vegetative treatments since remainder of work area will be vegetated. Rock placed would be used at the toe of the bank in conjunction with bioengineering techniques. RSP for bank protection is limited to approximately 300 cy. Up to 800 cy of rock is allowable.

Practice Name (NRCS Field Office Technical Guide Practice Code)	Practice Descriptions and Maximum Size of the Practice Installed (and additional limitations)
	cannot be reasonably controlled with upstream practices (e.g., establishment of vegetation for protection, installation of bank protection, or installation of upstream water control measures). “Bioengineered” solutions using vegetation and soft materials (as opposed to concrete and riprap, for example) are the preferred options where conditions are favorable for their use. The design and installation of grade stabilization structures produce a stable streambed favorable to wildlife and riparian growth. The Program does not cover projects that involve installation of grade stabilization structures in fish bearing streams. In non-fish bearing streams, this practice may be utilized to remove accumulated sand or sediment that have caused the channel to become plugged due to a large storm event or bank failure. This practice may not be used in fish-bearing streams or for routine maintenance involving dredging of a waterway. This practice may be used to remove sediment that has accumulated behind a dam or as a result of a catastrophic event such as a flood/debris flow and may be used in multiple locations under the project but only once at each location. Length: Average: 200 ft; Max: 2,000 ft. Width: Average: 20 ft; Max: 100 ft[7]. Area: Average: 0.1 acre; Max: 4.5 acres Volume: Average: 200 cy; Max: 7,500 cy (or 1,000 cy in Coastal Zone Scenic Areas). Flow Rate: Max: 400 cfs.

[7] The practice includes removal of accumulated sediment from up to 100 ft (across channel), if the channel has been widened due to scour associated with a dam, log jam or other barrier.

Practice Name (NRCS Field Office Technical Guide Practice Code)	Practice Descriptions and Maximum Size of the Practice Installed (and additional limitations)
12. Structure for Water Control (587)	Installation of a structure in an irrigation, drainage, or other water management system, including streams and gullies, that conveys water, controls the direction or rate of flow, or maintains a desired water surface elevation, such as culverts, pipe drops or chutes within gullies, debris screens, etc. Structures for water control include treatment systems, such as bioreactors, that improve on-site and/or downstream water quality. Structure for water control is used to replace or retrofit existing culverts that are either not functioning properly or are a barrier to fish passage. The placement of new culverts, when environmentally beneficial, is also covered. By controlling the velocity of water running through an area, this practice reduces erosion and prevents downcutting of stream channels. Culverts will be consistent with California Department of Fish and Game's "Culvert Criteria for Fish Passage" (CDFG 2003) and National Marine Fisheries Service Southwest Region's "Guidelines for Salmonid Passage as Stream Crossings" (NMFS 2019). Flow Rate: Max: 80 cfs
13. Underground Outlets (620)	Installation of a conduit beneath the surface of the ground to collect surface water and convey it to a suitable outlet. This practice is typically, although not always, associated with a sediment basin (with or without water control). Excess surface water generated by farmland on steep terrain can be collected and conveyed to a sediment basin by installing pipe safely buried underground. Location, size, and number of inlets are determined to collect excess runoff and prevent erosive surface flow. This runoff is then discharged at sediment basin where high velocity runoff is

Practice Name (NRCS Field Office Technical Guide Practice Code)	Practice Descriptions and Maximum Size of the Practice Installed (and additional limitations)
	calmed and suspended sediment is trapped prior to releasing water into natural drainage channel. The basin is designed to release water at a natural rate of flow. Length: Max. in Riparian Areas: 50 ft. Width: Max. in Riparian Areas: 20 ft. Area: Max. in Riparian Areas:1,000 square ft. Volume: Max. in Riparian Areas: 10 cy[8]. Flow Rate: Max. in Riparian Areas: 60 cfs.
14. Wetland Management (657, 659, 356, 587, 644)	To restore and enhance wetland conditions similar to those that existed prior to modification for farming, grazing, or other land use or to enhance habitat to create improved hydrologic function and wetland function for sensitive species. This practice includes minor reshaping to restore topographic relief of the site, hydrological enhancement (increasing season of inundation or saturation), and vegetative enhancement to remove any undesired species that did not originally exist on the site or to plant native species. To actively manage the water regime to improve habitat for desired species or to be able to manage for pest control (i.e. mosquitoes), a dike and/or a Structure for Water Control may be used. Once constructed, the maintenance of the practice(s) is allowable, including management of water levels and a wide range of vegetation management activities to maintain or improve the vegetative composition on a site. Area: 5 acres (Waters of the State); 18 acres total. Volume: 7,500 cy, 1,000 cy in coastal scenic areas.
15. Upland Wildlife Habitat Management (645, 382, 614, 516)	This practice will be utilized to create, restore, and/or enhance upland habitat for wildlife species. This practice may be used to: install

[8] Area of practice within riparian area includes a 50' length and a 20' wide work area for equipment. Volume of soil is based on a 2' wide trench over 50' with pipe buried to an average depth of 2'.

Practice Name (NRCS Field Office Technical Guide Practice Code)	Practice Descriptions and Maximum Size of the Practice Installed (and additional limitations)
	shelter, cover, and food; establish vegetation for shelter, food, and movement; and manipulate vegetation to sustain optimal habitat conditions. This practice may include the creation of infrastructure to accomplish the intended purpose of the practice, including a livestock pipeline, fence, and watering facility. The use of a pipeline would be for conveying water from an existing source of supply to points of use for livestock; and to shift livestock to constructed water sources and away from streams and lakes. This practice is designed to reduce bank erosion, sediment yield, and manure entering watercourses. Occasionally, a pipeline may cross streams or water courses. The watering facility practice is limited to the device that actually holds the water. It is not the well, spring, or other source of undeveloped water. The construction of a fence across a riparian corridor or in a sensitive habitat may be utilized to improve grazing and land use management to achieve restoration goals. Length: Average: 50 ft; Max: 200 ft through riparian areas (includes 50 ft on each bank and across a stream or gully), and up to 10,000 ft through the upland areas. Width: Average 15 ft; Max: 20 ft. Area: Max: 4,000 square ft. through riparian areas/crossing streams. Volume: Average: 15 cy; Max: 50 cy through riparian areas. Pressure: Max: 300 pounds per square inch (psi). (Highest capacity for a pipeline would not exceed 300 psi). The maximum livestock pipeline diameter would be 3 inches.

1.3.2 General Conditions for all Projects

The following general measures have been developed to reduce or avoid the potential adverse effects associated with actions to be covered by RGP 13. These measures, as appropriate for a specific activity, will be included as special conditions on any practice installed under the Program within the potential habitat of threatened and endangered species.

Temporal Limitations on Construction. The general construction season will be from April 15 to October 31, however modifications to that timeframe may be made on a site-specific basis. For projects that occur in streams that have salmonids or salmonid designated critical habitat the work window will be from June 15 to October 31. Restoration activities may be approved until December 31 and revegetation may extend beyond October 31 to November 30[9]. All earthmoving activities would be complete by October 31. Additional erosion control measures, as described below under Conditions for Erosion Control, will be implemented for work conducted during the winter period (generally defined as October 15 through May 15).

Where habitat for Federal and State listed species is identified on or adjacent to the project work site, construction and activities that may disturb the breeding, feeding, mating and sheltering of these species shall be limited to avoid potential impacts. If working within 75 feet of established riparian vegetation, work may not begin until after August 1. If construction must occur during this period, the RCD shall consult with California Department of Fish and Wildlife (CDFW) or an individual approved by CDFW shall conduct pre-construction surveys for bird nests or nesting activity in the project area. Bird nesting sites shall be avoided during the nesting season.

For invasive species removal in upland habitat (and where listed salmonids are not present), work may occur throughout the year. For invasive species removal in riparian habitat, work may continue until May 30, when rain conditions allow and if no known species occurrences are documented within the past two years or if protocol level surveys are conducted and no species are found. If historical information is not available for the site, protocol levels surveys will be conducted in the area to determine presence or absence of listed species prior to the onset of work. If listed species are present (or assumed present based on habitat), a Service-approved individual will be present during work activities. All work in riparian habitat, during the wet season, will be completed by non-mechanized hand tools. Herbicide application will be hand-painted and carefully applied during non-windy days with no rain forecasted within 3-5 days. If listed species are present (or assumed present based on habitat), a Service-approved individual will be present during work activities. All work during the wet season will be completed by non-mechanized hand tools. Herbicide application will be hand-painted and carefully applied during non-windy days with no rain forecasted within 3-5 days.

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[9] For Tier II and III projects, revegetation (by hand) can occur when rain conditions allow. No construction activities (other than manual, on foot, revegetation/erosion control actions) shall be conducted below top of creek banks or in other waters of the State during the winter period (October 15 – May 30), unless prior written approval has been obtained from Central Coast Water Board staff. Invasive species removal under Tier III can occur with early consultation with NMFS.

Work beyond the proposed construction period may be authorized following consultation with CDFW, U.S Fish and Wildlife Service (FWS), Corps, and/or NMFS and provided the work would be completed prior to first winter rains and stream flows.

Limitation on Earth Moving and Vegetation Removal (Site Disturbance). In addition to the limitations on the amount of grading that can be performed, the following conditions apply to projects involving grading.

Disturbance to existing grades and vegetation will be limited to the actual site of the conservation project and necessary access routes. Placement of temporary access roads, staging areas, and other facilities shall avoid and limit disturbance to habitat as much as possible. Disturbance of native shrubs, woody perennials or tree removal on the streambank or stream channel shall be avoided or minimized to the fullest possible extent. If trees over 6 inches diameter at breast height (dbh) are to be removed, they will be replaced at a 3:1 ratio, unless the site is being restored to historical or other designated habitat. If riparian vegetation will be disturbed, it will be replaced with similar species. Finished grades will not be steeper than 2:1 side slopes unless pre-construction condition is so steep that site conditions prohibit a 2:1 slope on the final grade.

Special care will be given to stands of riparian habitat of a size greater than 0.5 acres. As much as possible, project activities will avoid thinning out stands of riparian vegetation to minimize potential for increased cowbird predation. If vegetation removal is required in or around stands of this size, riparian vegetation will be cleared by hand, leaving as much as possible of the root wad and base of plants intact. Following completion of construction, poles and branches will be replanted on banks.

Implementation of practices shall minimize all potential contributions of sediment to waterways, to ensure only short-term disturbance from insignificant amounts of fine sediment during construction. To the greatest extent possible, excavated materials will be reintegrated on site. In the rare situations where excavated material is not used in the implementation of the practice it will be removed and placed at sites that have no direct connectivity to a waterway.

Upon completion of grading, slope protection of all disturbed sites will be provided prior to the end of the construction season through a combination of permanent vegetative treatment, mulching, geotextiles, and/or rock. Only native plant species or non-invasive, non-persistent grass species will be used.

Limitations on Construction Equipment. Equipment operators will ensure that contamination of habitat does not occur during routine operations. The use or storage of petroleum-powered equipment shall be accomplished in a manner to prevent the potential release of petroleum materials into waters of the state (Fish and Game Code 5650). All workers shall be informed of the importance of preventing spills and of the appropriate measures to take, should a spill occur.

The following precautionary measures will be adhered to:

1. Schedule excavation and grading activities for dry weather periods.
2. A contained area is designated for equipment storage, short-term maintenance, and refueling.
3. It is located 100 feet from waterbodies. If site conditions (property size) make this 100-foot distance infeasible, these activities will occur at the maximum distance possible from aquatic areas.
4. Vehicles are inspected for leaks and repaired immediately.
5. Leaks, drips, and other spills are cleaned up immediately to avoid soil or groundwater contamination.
6. Major vehicle maintenance and washing are done off site.
7. All spent fluids including motor oil, radiator coolant, or other fluids and used vehicle batteries are collected, stored, and recycled as hazardous waste off site.
8. All construction debris and sediments are taken to appropriate landfills or in the case of sediments, disposed of in upland areas or off-site.
9. Dry cleanup methods (i.e. absorbent materials, cat litter, and/or rags) are used whenever possible. If water is used, the minimal amount required to keep dust levels down is used.
10. Spilled dry materials are swept up immediately.

Heavy equipment shall not be used in flowing or standing water, except to cross a stream or pond to access the work site. When possible, equipment shall use existing ingress or egress points and/or perform work from the top of the creek banks. Use of heavy equipment shall be avoided in a channel bottom with rocky or cobbled substrate. If access to the work site requires heavy equipment to travel on a rocky or cobbled substrate, a rubber tire loader/backhoe is the preferred vehicle. Only after this option has been determined impossible will the use of tracked vehicles be considered. The amount of time this equipment is stationed, working, or traveling within the creek bed shall be minimized. When heavy equipment is used, woody debris and vegetation will be replaced to a similar density with native species. No staging will occur in wetlands. If it is not feasible to completely avoid movement of construction vehicles through wetlands, whenever possible, rubber-tired vehicles will be used or a mat will be laid down prior to moving across these areas.

Additional measures for in-channel work in fish-bearing streams. When work is conducted in fish-bearing streams, the following additional measures will be implemented.

- Oil absorbent and spill containment materials will be located on site when mechanical equipment is in operation. If a spill occurs: (1) no additional work will occur in-channel until mechanical equipment has been inspected and the leak has been prepared; (2) the spill has been contained; and (3) the CDFW and NMFS are contacted to evaluate the impacts of the spill.
- All questionable motor oil coolant, transmission fluid, and hydraulic fluid hoses, fitting, and seals on construction equipment will be replaced.
- All mechanical equipment will be inspected on a daily basis to ensure there are no

motor oil, transmission fluid, hydraulic fluid, or coolant leaks.

- All leaks will be repaired in the equipment staging area or other suitable location (away from watercourses) prior to resumption of construction activity.
- Hydraulic fluids in mechanical equipment working within the active stream channel shall not contain organophosphate esters.
- Construction equipment will be staged at least 100 feet from any watercourse with direct connectivity of Class I streams (i.e., fish-bearing streams). If site conditions (property size) make this 100-ft distance infeasible, these activities will occur at the maximum distance possible from the watercourse. Equipment will be parked in the staging area when not in use.
- Equipment will not be parked or stored near the active channel.
- During construction the operator will not dump any trash or construction debris into the wetted channel.
- During the project activities, all trash and food that may attract potential predators of salmonids (e.g., raccoons, piscivores, etc.) will be properly contained, removed from the work site, and disposed of daily.

Revegetation and Removal of Exotic Plants. The project area shall be restored to pre-construction condition or better. All exposed soil resulting from the project's construction activities shall be revegetated using live planting, seed casting or hydroseeding. Any stream bank area left barren of vegetation as a result of the implementation or maintenance of the practices shall be restored to a natural state by seeding, replanting, or other agreed upon means with native trees, shrubs, and/or grasses prior to the close of the construction season of the project year. Soil above rock riprap, and interstitial spaces between rocks shall be revegetated by live planting, seed casting, or hydroseeding prior to the close of the construction season. Annual inspections for the purpose of assessing the survival and growth of revegetated areas and the presence of exposed soil shall be conducted for two years following the end of the project installation. For projects that have removed native vegetation, post-construction revegetation success shall be equivalent or better to the pre-project condition provided in the project description. Revegetation success will be documented in the annual report provided to the regulatory agencies each year.

The spread or introduction of exotic plant species shall be avoided to the maximum extent possible by avoiding areas with established native vegetation during project activities, restoring disturbed areas with native species where appropriate, and post-project monitoring and control of exotic species. Removal of invasive exotic species shall be strongly recommended. Mechanical removal (hand tools, weed whacking, hand pulling, brush raking) of exotics shall be done in preparation for establishment of perennial plantings. To the greatest extent possible, vegetation will be removed by hand. To the extent possible, revegetation should be implemented at the same time removal of exotic vegetation occurs. All plant material will be disposed of in a manner that will not allow re-establishment to occur.

Native plants characteristic of the local habitat type shall be the preferred alternative when implementing and maintaining the practices in natural areas. Non-invasive, non-persistent grass species (i.e. barley grass) may be used as nurse crops or for their temporary erosion control benefits to stabilize disturbed slopes until natives are established.

Conditions for Erosion Control. Nearly all of the conservation practices included under the Program are designed to control erosion and sedimentation. However, the construction and installation of the practices can potentially result in short term, minor erosion or sedimentation. The following measures will be used to prevent or minimize sediment deposition as a result of implementation and maintenance of projects.

Earthmoving activities will be completed prior to October 31. For any work conducted during the winter period (generally defined as October 15 through May 15), all inactive areas (defined as a five-day period of no earthmoving activity) shall have all necessary soil stabilization practices in place two days after identification of inactivity or before a rain event, whichever comes first.

Erosion control and sediment detention devices shall be incorporated into the project design and implemented at the time of construction. These devices shall be in place prior to the onset of rains for the purposes of minimizing fine sediment and sediment/water slurry input to flowing water, and of detaining water to retain sediment on-site. These devices will be placed at all locations where the likelihood of sediment input exists. Sediment collected in these devices shall be disposed of away from the collection site and above the normal high-water mark.

The project site shall be restored to pre-construction condition or better. Streambank, ground and/or soil (except for soil in agricultural fields) exposed as a result of construction, soil above toe-rock shall be revegetated by live planting, seed casting, or hydroseeding prior to the close of the construction season of the project year.

All debris, sediment, rubbish, vegetation or other material removed from waterway shall be removed to a location where they shall not re-enter the waters of the state.

Limitations on Work in Streams and Permanently Ponded Areas. If it is necessary to conduct work in or near a live stream, the workspace shall be isolated from flowing water to prevent sedimentation and turbidity. Prior to construction activities, sandbag cofferdams, straw bales, silt fences, culverts or visqueen (diversions) shall be installed to divert streamflow away from or around workspace at an appropriate rate to maintain downstream flows during construction.

In non-fish bearing streams, if a project requires dewatering any area, either a pump shall remove water to an upland disposal site, or a filtering system shall be used to collect the water and return clear water to the creek.

In fish bearing streams, if a project requires dewatering any area, water shall be pumped to a filtering system that would collect the water and return clear water to the creek. The pump will be screened according to NMFS' screening criteria (NMFS 1997a). For work proposed when listed species are present, a qualified individual approved by NMFS will act as a biological monitor during construction. See **Section 1.3.6 – Guidelines for Monitoring and Relocation of Listed Salmonids** for specific measures that must be implemented when salmonids have to be relocated from work areas.

Given the potential adverse effects of dewatering on salmonid populations, in some instances large wood will be installed within the active stream channel without dewatering. NMFS staff must review and approve the plan. An approved biologist will be on-site during all activities to monitor for mortalities and/or adverse impacts to water quality.

The implementation and maintenance of projects shall not result in sediment delivery to a clean bottom of stream channel. A "clean bottom" is characterized by natural stream substrate (cobbles, gravel and small stones or similar to background conditions). If the substrate of a seasonal pond, creek, stream or water body is altered during work activities and the alteration is not the goal of the practice being implemented (i.e. channel stabilization), it shall be returned to approximate pre-construction conditions after the work is completed, unless the RCD and NMFS/CDFW determine that other measures should be implemented.

All debris, sediment, rubbish, vegetation or other material removed from the channel banks, channel bottom, or sediment basins shall be removed to a location where they shall not re-enter the waters of the state. All petroleum products chemicals, silt, fine soils, and any substance or material deleterious to fish, plant, or bird life shall not be allowed to pass into, or be placed where it can pass into the waters of the State.

Limitations on the use of Herbicides. Except as noted below, no pesticides or soil amendments shall be used in the streambed or bank to hasten or improve the growth of critical area plantings. Soil amendments will only be used when the establishment of new plants is prohibited by poor soil structure that cannot support new plantings. In most circumstances, organic amendments shall be used to ensure successful establishment of restoration vegetation associated with the practices. In situations where organic amendments will not guarantee adequate establishment of restoration vegetation, application rates for non-organic soil amendments will be based on soil nutrient testing and shall utilize slow release or split applications to minimize leaching or runoff into water bodies. Soil amendments may be used on stream banks above the normal high water mark during the year of planting, if necessary.

The following list of herbicides and adjuvants will be used to control non-native, invasive species in the same ways (e.g. spot spraying, cutting and then hand painting on target species limited broadcast applications) and at the same labeled application rates as previously analyzed in NMFS (2021, 2020). For the adjuvants, the RCD has procured a list of Spray Adjuvants Registered for Use on Aquatic Sites in Washington (WSDA 2017) and will only use those adjuvants on this list approved for and rated as practically non-toxic to both rainbow trout and water flea.

Herbicides will only be used to treat non-native, invasive species that are not well controlled by mechanical removal techniques such as grubbing, mowing, cutting or solarization. The herbicides proposed for use include: glyophosate, aminopyralid, chlorosulfuron, aminocyclopyrachlor + chlorosulfuron, triclopyr, imazapyr, and dicamba.

Best management practices will be implemented to prevent or minimize exposure of salmonids and their habitat from the above-mentioned herbicides and their adjuvants used during application and include:

- When herbicides are used near waterways, an herbicide that is safe to use in or near aquatic habitats will be utilized. To the greatest extent feasible, herbicide will be hand-painted on target species to minimize exposure of non-target species to the herbicide.
- Localized spot treatment using hand-held devices are limited to herbicides rated as practically non-toxic to aquatic receptors (i.e. fish and aquatic invertebrates) by the EPA such as aquatic labeled glyphosate (e.g. Rodeo®) or aminopyralid (i.e. Milestone).
- Herbicides will not be used within 60-ft of a waterway unless its application is for the purposes of controlling state-designated invasive species and noxious weeds.
- All herbicides (except dicamba) proposed for use under the Program will be subject to a 100-foot buffer for broadcast applications, 15-foot buffer for spot spraying, and use up to the waterline for hand applications (wiping, wicking, injection) near waterbodies or ditches containing water. For dry streams, wetlands or ditches, broadcast applications shall be subject to a 50-foot buffer but spot spraying and hand applications may be done without a buffer.
- Dicamba will not be applied by broadcast application because of its issues associated with drift that can result in an uncontrolled exposure scenario. Spot spraying and hand application would occur within proposed buffers.
- Herbicides with higher fish toxicity fish risks, such as Garlon 4, 2-4 D, Chlorothalonil, and Diuron will not be used.
- In all situations, the herbicides must be applied according to registered label conditions and applied by a licensed herbicide applicator. Herbicides must be applied directly to plants and may not be spread upon any water or where they can leach into waterways in subsequent rains.
- Herbicides shall not be applied within 24 hours of predicted rain events (40 percent chance or greater for rainfall) to reduce the potential for runoff of herbicides into surface water bodies.
- Foliar application of herbicides or other spray application methods, in upland habitats, shall not be applied when wind speeds exceed 10 miles per hour to reduce likelihood of drift into surface water bodies.
- All containers of materials shall be labeled, used, stored, recorded, reported, and disposed of according to California Department of Pesticide (DPR) regulations.
- Herbicide application will comply with the U.S. Environmental Protection Agency (EPA) label directions, as well as California Environmental Protection Agency and DPR label standards. The RCD will comply with all laws and regulations governing the use of herbicides.
- An herbicide safety/spill response plan will be implemented to reduce the likelihood of spills, misapplication, reduce potential for unsafe practices, and to identify remedial

actions in the event of spills.

- Mix herbicides more than 150 feet from any natural waterbody to minimize the risk of an accidental discharge. Wash spray tanks further than 300 feet away from surface water. Check that all hauling and application equipment is free from leaks and operating as intended.
- Have trained applicators apply herbicides under direct supervision of a Qualified Applicator Licensee.
- Keep records of each application, including the active ingredient, formulation, application rate, date, time, and location.
- The surfactants R-11, POEA, and herbicides that contain POEA (e.g. Roundup) will not be used.
- Herbicide carriers (solvents) are limited to water or specifically labeled vegetable oil.
- Be aware of wind directions and potential for herbicides to affect aquatic habitat area downwind.
- Keep spray as low as possible to reduce wind effects.
- Avoid or minimize drift by using appropriate equipment and settings (e.g., nozzle selection, adjusting pressure, drift reduction agents). Select proper application equipment (e.g., spray equipment that produces 200- to 800-micron-diameter droplets).
- Follow herbicide label directions for maximum daytime temperature permitted.
- Do not spray during periods of adverse weather conditions (snow or rain imminent, fog, etc.).
- Herbicides shall not be applied when the soil is saturated or when a precipitation event likely to produce direct runoff to fish-bearing waters from a treated site is forecasted within 48 hours following application.
- Broadcast spraying using booms mounted on ground-based vehicles, with the following restrictions:
  - Do not broadcast spray within 100 feet of open water when wind velocity exceeds 5 miles per hour (mph).
  - Do not broadcast spray when wind velocity exceeds 10 mph.
  - Do not spray if precipitation is occurring or is imminent (within 24 hours).
  - Do not spray if air turbulence is sufficient to affect the normal spray pattern.
  - Dyes or colorants, (e.g., Hi-Light, Dynamark) will be used as needed to assist in treatment assurance and minimize overspraying within 100 feet of water.
  - Do not spray when wind speeds exceed 10 miles per hour to reduce the likelihood of spray/dust drift. Winds of 2 mph or less are indicative of air inversions. The applicator must confirm the absence of an inversion before proceeding with the application whenever the wind speed is 2 mph or less.

The RCD will also report herbicide use to the Corps and NMFS. The report will detail all the chemicals (herbicides and adjuvants) used in the Program, where they were used, how many acres in total treated by which method and how many times, and how many acres in total treated within 100 feet of a river or a wetted stream by which method, what herbicides used on what weeds, distance to nearest waterbody, and best management practices (BMPs) followed. Any known incidents of exposure of a wetted waterbody or other problem that may have affected aquatic resources shall be documented in the summary report.

The following additional protection measures will be implemented when each of the following conservation practices are implemented as part of a project under the permit coordination program.

1.3.3 Environmental Protection Measures and Conditions for Specific Conservation Practices

Planting (342, 612, 422, 391) and Restoration and Management of Declining Habitats (643)

- Measures will be taken to plant a sufficient diversity of native species to ensure that monocultures are not established as a result of this practice. Non-native invasive species will not be planted.
- To meet success criteria for revegetation or invasive plant removal, maintenance will occur as needed within appropriate temporal limitations.
- When implementing or maintaining a planting above the high water line, a filter fabric fence, fiber rolls and/or straw bales shall be utilized, if needed, to keep sediment from flowing into the adjacent water body. Straw bales would likely be separated and used as mulch. Planting above the ordinary high water mark that does not involve soil disturbance may occur at any time of the year.[10] When vegetation is sufficiently mature to provide erosion control, it may be appropriate to remove the fence, fiber rolls and/or hay bales. Annual review by RCD shall occur until the critical area planting is established to control erosion.

Structure for Water Control (587)

- Crossings will be consistent with California Department of Fish and Game's (CDFG) *Culvert Criteria for Fish Passage* (CDFG 2002) and National Marine Fisheries Service Southwest Region's *Guidelines for Salmonid Passage at Stream Crossings* (NMFS 2019).
- Ditch relief culverts which outlet onto a slope >30% will have a review letter by NRCS.

[10] The "ordinary high water mark" on non-tidal rivers is defined by the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank; shelving; changes in the character of soil; destruction of terrestrial vegetation; the presence of litter and debris; or other appropriate means that consider the characteristics of the surrounding areas. Some indicators of the ordinary high water mark include water staining, shelving, and evidence of debris, among other potential indicators.

Access Road (Improvement) (560)

- Road improvements in Santa Cruz County are modeled on the Handbook for Forest and Ranch Roads: A guide for planning, designing, constructing, reconstructing, maintaining and closing wildland roads, by William Weaver and Danny Hagens (Weaver and Hagans 1994).

Grassed Waterway (412)

- Grassed waterways are designed to convey the runoff associated with the contributory area along a prescribed slope to avoid erosion caused by the concentrated flow. The waterway may not divert water out of the natural subwatershed. Diversion does not involve diverting water from a waterway.

Underground Outlet (620)

- A properly sized energy dissipater shall be installed to reduce bank scour and bank erosion when a pipe or structure that empties into a stream (underground outlet).

Grade Stabilization Structure (410)

- Construction and maintenance of Grade Stabilization Structures in streams or creeks that are fish-bearing are not covered under this program. Structures may be installed in gullies and non-fish-bearing streams. Projects seeking to implement conservation practices in fish habitat must seek individual permits from appropriate public agencies.

Stream Channel Stabilization (584)

- Construction and maintenance of any practice that results in a change in volume of flow in fish-bearing streams are not covered under the Program.
- Sediment removal from the stream channel or ponds may occur if it will improve biological functioning of the stream and restore channel capacity. Sediment removal would occur as a one-time event and not a repeated maintenance practice. Sediment removal may not occur in a flowing stream or standing water. Sediment will not be stored in wetlands or waterways.

Streambank Protection (580)

- Construction and maintenance of any practice that results in a change in volume of flow in fish-bearing streams are not covered under the Program.
- No creosote treated timbers shall be used for grade or channel stabilization structures, bulkheads or other instream structures. No gabions or concrete will be used in fish-bearing streams. In non-fish-bearing streams they may be used above the high water mark. Grouted rock may be used for implementation of the Grade Stabilization practice at

the head of gullies. Use of grouted rock will be minimized. Grouted rock would not be used on the bed or bank of a waterway.

Stream Crossing (578)

- Construction and maintenance of any practice that results in a change in volume of flow in fish-bearing streams are not covered under the Program.

Stream Habitat Improvement and Management (395))

- Construction and maintenance of any practice that results in a change in volume of flow in fish-bearing streams are not covered under the Program.
- Practices will be designed and implemented in accordance with the CDFG *California Salmonid Stream Habitat Restoration Manual.*
- Design of in-stream structures shall be compatible with the dynamic nature of the watercourse to encourage natural geomorphic processes as much as possible. In-stream structures in fish-bearing streams will be designed in consultation with staff from NMFS and CDFW.

Upland Wildlife Habitat Management (645, 382,516, 614)

- Pipeline shall be installed and maintained only when a streambed is dry or dewatered. Trenching associated with this practice must be a minimum of three feet deep.
- No development of new water sources is included in this practice.

Sediment Basin (350) with or without a Structure for Water Control (638)

- Maintenance may occur only after August 1.
- Sediment basins shall not be constructed in a stream channel or other permanent water bodies. The work may involve grading along one shore of the stream to remove gullies or eroded banks prior to building a stream-side basin. Where construction of a sediment basin includes a pipe or structure that empties into a stream, an energy dissipater shall be installed to reduce bank scour.

Wetland Management (657, 659, 356, 587, 644)

- Activities will seek to emulate the functions of undisturbed conditions.
- Activities will not result in significant loss of vegetation or disturbance which would negatively impact species' habitat, cover, food, etc.

Obstruction Removal (500)

- Wherever possible, hand labor will be used, however, heavy equipment such as mechanical excavators may be employed in some projects, particularly where the project requires removal of larger items such as cars and appliances. Large objects removed from the area will be lifted out of the area, ensuring the obstruction is kept upright during removal and will not be pulled, dragged, or pushed to minimize potential impacts to the aquatic and terrestrial habitats. If the obstruction is easily accessible and/or an access road is adjacent to the work site, equipment such as a boom would be used to lift the obstruction out of the area. Additional limitations on the use of construction equipment are described in the **Section 1.3.2 - General Project Conditions** under ***Limitations on Construction Equipment***.

If dewatering in a fish-bearing stream is proposed as part of a project implemented under the permit coordination program it will adhere to the ***Limitations on Work in Streams and Permanently Ponded Areas*** (Section 1.3.2).

1.3.4 Tiered Approach for Project Requirements

The conservation practices and environmental protection measures have been categorized in a tiered impact matrix, an approach developed by the Central Coast Regional Water Quality Control Board (CCWQCB). For instance, Tier I level projects have the lowest impacts on riparian and aquatic habitat, whereas Tier III projects are likely to dewater sections of stream and relocate ESA-listed species. The matrix provides a framework of environmental protection measures that increase in complexity with a practice's or project's increasing potential impact. The tiering strategy was developed as a way to ensure maximum protection of CCC coho salmon, given their low numbers throughout the ESU.

- Tier I projects only occur in the upland areas and may occur year-round.
- Tier II projects occur in streams or riparian areas where salmon and steelhead do not exist (e.g., ephemeral channels in headwater streams or screened irrigation ditches). In order to implement a Tier II project, a stream may be dewatered temporarily and the project will be constructed from June 15 to October 31 of each year.
- Tier III projects occur in streams that have salmonids or salmonid designated critical habitat. The work window for these projects is June 15 to October 31. The RCD will provide an electronic Pre-Construction Notification (PCN) to the Corps and NMFS by May 15 for Tier III projects.

1.3.5 Notification and Reporting

PCNs for Tier III projects will include information on listed species and critical habitat present in the area affected by the project, potential impacts to listed species and critical habitat, and all applicable environmental protection and mitigation measures. After reviewing the draft PCN, if NMFS staff conclude there are projects that need further review and/or modification to meet the criteria established by the Program, the RCD will be contacted to discuss those specific projects and resolve the outstanding issues. During these discussions, if NMFS concludes additional protection measures or other project revisions, if adopted, would meet the Program's criteria, they will work with the RCD to determine how these measures/revisions can be incorporated into the project. Following discussions with NMFS, the RCD will send a revised PCN (Final PCN) to

NMFS, incorporating any revisions. Projects that the RCD cannot revise to fit into the Program will be consulted on separately by the Corps if they may affect listed salmonids.

Following the annual review of projects, the RCD will provide an annual Program status report to NMFS of all Tier III projects implemented during the previous year, as well as projects previously constructed that were monitored during the year, and describe each project's purpose, area affected, size and volume of material removed or placed, and the participating landowners. Conservation benefits achieved by each project will be discussed, and any net gains in riparian or other aquatic habitat described. Finally, all actions taken to avoid adverse effects to listed species and any incidental take of federally listed species will be noted and explained. The report will also include photo documentation of site conditions prior to and following construction. The report will be submitted to NMFS by January 31of each year.

1.3.6 Guidelines for Monitoring and Relocation of Listed Salmonids

- For work proposed when listed species are present, a qualified individual approved by NMFS will act as a biological monitor during construction. The biological monitor will monitor construction activities and instream habitat and performance of sediment control devices. The biological monitor will have the authority to halt work activity and recommend measures for avoiding adverse effects. Work activity will not recommence until the situation is resolved to the satisfaction of the biological monitor.

- If a streamflow diversion is necessary in a stream known to contain listed salmonids, the biological monitor will monitor placement and removal of the streamflow diversion structures. If necessary, a pump will be used to dewater the work space and will be screened according to NMFS' screening criteria (NMFS 1997a).

- If streamflow is diverted in fish bearing streams, or the biological monitor determines coho salmon or steelhead must be removed from a workspace, or if an unanticipated event occurs that could impact individuals of either of these species, they will notify a NMFS approved fisheries biologist qualified to capture and transport salmonids.

- The NMFS approved fisheries biologist will capture any steelhead and coho salmon stranded in residual wetted areas as a result of the streamflow diversion and/or workspace dewatering and relocate them to a suitable location immediately upstream or downstream of the project area. The biologist will note the number of steelhead and coho salmon observed, the number relocated, and the date and time of the collection and relocation. One or more of the following NMFS collection methods will be used by a qualified fisheries biologist: electrofishing, seine netting, or other collection method approved by NMFS.

1.3.7 Five-year Program Assessment and Evaluation

After five years of implementation of the Program (following the 2026 construction season), the RCD will compile a comprehensive assessment of the Program and all projects constructed to that point. The assessment will summarize the types of projects and conservation practices installed, and discuss the Program's successes and challenges, including the regulatory process required to comply with the Program's permits and authorizations. The compiled data will be utilized to provide NMFS with a general overview of the Program's effectiveness, and provide an opportunity for NMFS and RCD to discuss needed improvements before continuance of the next five years of the Program. At the end of the tenth year of Program implementation (2031), a final comprehensive assessment will be submitted to NMFS.

1.3.8 Maintenance and Monitoring of Conservation Practices Under the Program

All RCD funded projects will be monitored for 3-5 years post-construction until the success criteria is achieved. These reviews will include an examination of the practices' current condition, a comparison of as-built conditions with the original plans (including all plantings and other vegetation), and recommendations for resolving and problems encountered.

1.3.9 Training for Project Workers

Trainings the RCD provide for Program implementation will clearly stipulate the special conditions of this Program. Prior to activities that result in the disturbance of habitat or individuals of any listed species, all project workers, including RCD staff, consultants, construction workers, and cooperators, will be given information on listed species in the project area, a brief overview of the species' natural history, the protection afforded the species by the ESA, and the specific protective measures to be followed during implementation of the practices. Qualified RCD staff or biological consultants will conduct the training and supply the information.

1.3.10 Compliance and Non-Compliance

Prior to implementation of the conservation practices, the RCD will notify the cooperator[11] of the Program's environmental protection measures and all permit conditions through the signed Cooperator Agreement. If the work carried out is not consistent with design standards of the Program, including the environmental protection measures as proposed, RCD staff will notify the cooperator and work directly with them to resolve the problem.

If a cooperator fails to work with the RCD and resolve the problem, the RCD will notify the cooperator in writing that their activities are inconsistent with the Program and that the cooperator's actions are no longer covered by the Program's permits and agreements. The cooperator will then be responsible for obtaining individual permits from the appropriate regulatory agency.

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

[11] Landowner, contractor and operator are individually referred to as a "cooperator". The contractor or operator can be for the landowner or for the RCD.

2 ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

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

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and/or an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of" a listed species, which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both the survival and recovery of the species.

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

The designations of critical habitat for CCC coho salmon, 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 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 would 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.

2.2.1 Species Description and Life History

The biological opinion analyses the effects of the federal action on the following federally listed species (Distinct Population Segment [DPS] or Evolutionarily Significant Unit [ESU]) and designated critical habitat:

Endangered Central California Coast (CCC) coho salmon ESU (*Oncorhynchus kisutch*)
Endangered (70 FR 37160; June 28, 2005)
Critical habitat (64 FR 24049; May 5, 1999);

Threatened Central California Coast (CCC) steelhead DPS (*Oncorhynchus mykiss*)
Threatened (71 FR 834; January 5, 2006)
Critical habitat (70 FR 52488; September 2, 2005);

Threatened South-Central California Coast (S-CCC) steelhead DPS (*Oncorhynchus mykiss*)
Threatened (71 FR 834; January 5, 2006)
Critical habitat (70 FR 52488; September 2, 2005).

The CCC steelhead DPS includes steelhead in coastal California streams from the Russian River to Aptos Creek, and the drainages of Suisun, San Pablo, and San Francisco Bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin Rivers. In addition, the DPS includes steelhead from one active artificial propagation program: the Don Clausen Fish Hatchery Program.[12] The S-CCC steelhead DPS includes naturally spawned steelhead originating below natural and manmade impassible barriers from the Pajaro River to (but not including) the Santa Maria River. The CCC coho salmon ESU includes coho salmon from Punta Gorda in northern California, south to, and including, Aptos Creek in central California, as well as populations in tributaries to San Francisco Bay, excluding the Sacramento-San Joaquin River System. In addition, the ESU includes coho salmon from the following artificial propagation programs: the Russian River Coho Salmon Captive Broodstock Program[13], and the Southern Coho Salmon Captive Broodstock Program.[14]

The action area is within designated critical habitat for CCC steelhead, S-CCC steelhead, and CCC coho salmon. CCC steelhead critical habitat is designated from the Russian River to Aptos Creek to a lateral extent of ordinary high water in freshwater stream reaches, and to extreme high water in estuarine areas. S-CCC steelhead critical habitat is designated from the Pajaro River to (but not including) the Santa Maria River to a lateral extent of ordinary high water in freshwater stream reaches, and to extreme high water in estuarine areas. CCC coho salmon critical habitat is designated to include all river reaches assessable to listed coho salmon from Punta Gorda in northern California south to the San Lorenzo River in central California, and includes two tributaries to San Francisco Bay, Arroyo Corte Madera Del Presidio and Corte Madera Creek. Critical habitat consists of the water, substrate, and adjacent riparian zone of estuarine and riverine reaches (including off-channel habitats).

2.2.1.1 Steelhead Life History

Steelhead are anadromous forms of *Oncorhynchus mykiss*, spending some time in both fresh- and saltwater. Juveniles migrate to the ocean where they mature. Adult steelhead return to freshwater rivers and streams to reproduce, or spawn. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning in multiple years before death (Busby et al. 1996; Moyle 2002). Although one-time spawners are the great majority, Shapovalov and Taft (1954) reported that repeat spawners are relatively numerous (17.2 percent) in central California coastal streams. Eggs (laid in gravel nests called redds), alevins (gravel dwelling hatchlings), fry (juveniles newly emerged from stream gravels), and other juvenile life stages all rear in freshwater until they migrate to the ocean where they reach maturity.

O. mykiss exhibit a variable life history. Coastal *O. mykiss* populations in central and southern California are classified into three principle life history strategies: fluvial-anadromous, lagoon anadromous, and freshwater resident or non-anadromous (Boughton et al. 2007). The

[12] Kingfisher Flat Hatchery previously had a small CCC steelhead hatchery program that released steelhead smolts into Scott Creek and the San Lorenzo River. That program was terminated in 2014.
[13] Formerly referred to as the Don Clausen Fish Hatchery Captive Broodstock Program.
[14] Formerly referred to as the Scott Creek/Kingfisher Flat Conservation Program and the Scott Creek Captive Broodstock Program.

anadromous forms of CCC steelhead are classified as “winter-run” steelhead because they emigrate from the ocean to their natal streams to spawn annually during the winter; although run times can extend into spring (Moyle 2002). Within the CCC and S-CCC steelhead DPSs, adults typically enter freshwater between December and April, with peaks occurring in January through March (Wagner 1983; Fukushima and Lesh 1998). It is during this time that streamflow (depth and velocity) are suitable for adults to successfully migrate to and from spawning grounds. The minimum stream depth necessary for successful upstream migration is about 13 centimeters (cm), although short sections with depths less than 13 cm are passable (Thompson 1972). More optimal water velocities for upstream migration are in the range of 40-90 cm/s, with a maximum velocity beyond which upstream migration is not likely to occur of 240 cm/s (Thompson 1972).

Redds are generally located in areas where the hydraulic conditions limit fine sediment accumulations. Reiser and Bjornn (1979) found that gravels of 1.3-11.7 cm in diameter were preferred by steelhead. Survival of embryos is reduced when fines smaller than 6.4 mm comprise 20 to 25 percent of the substrate. This is because, during the incubation period, the intragravel environment must permit a constant flow of water in order to deliver dissolved oxygen and remove metabolic wastes. Studies have shown embryo survival is higher when intragravel velocities exceed 20 cm/hour (Coble 1961; Phillips and Campbell 1961). The number of days required for steelhead eggs to hatch is inversely proportional to water temperature and varies from about 19 days at 15.6˚ degrees (°) Celsius (C) to about 80 days at 5.6°C. Fry typically emerge from the gravel two to three weeks after hatching (Barnhart 1986). Other intragravel parameters such as the organic material in the substrate affect the survival of eggs to fry emergence (Shapovalov and Taft 1954; Everest et al. 1987; Chapman 1988).

Once emerged from the gravel, steelhead fry rear in edgewater habitats along the stream and gradually move into pools and riffles as they grow larger. Cover, sediment, and water quality are important habitat components for juvenile steelhead. Cover in the form of woody debris, rocks, overhanging banks, and other in-water structures provide velocity refuge and a means of avoiding predation (Shirvell 1990; Bjornn and Reiser 1991). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. In winter, juvenile steelhead become less active and hide in available cover, including gravel or woody debris. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. 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 10 and 19°C (Hokanson et al. 1977; Wurtsbaugh and Davis 1977; Myrick and Cech 2005). Fluctuating diurnal water temperatures are also important for the survival and growth of salmonids (Busby et al. 1996).

Although variation occurs, juvenile steelhead that exhibit an anadromous life history strategy usually rear in freshwater for 1-2 years (NMFS 2016b). Steelhead smolts emigrate episodically from freshwater in late winter and spring, with peak migrations occurring in April and May (Shapovalov and Taft 1954; Fukushima and Lesh 1998; Ohms and Boughton 2019). Steelhead smolts in California range in size from 120 to 280 mm (fork length) (Shapovalov and Taft 1954;

Barnhart 1986). Smolts migrating from the freshwater environment may temporarily utilize the estuarine habitats for saltwater acclimation and feeding prior to entering the ocean.

Juvenile steelhead of the lagoon-anadromous life history rear in lagoons for extended periods (Smith 1990; Boughton et al. 2006; Hayes et al. 2008). Lagoons are a specific type of estuarine habitat where a seasonal impoundment of water develops after a sandbar forms at the mouth of the watershed, temporarily separating the fresh and marine environments (Smith 1990). Like other estuary types, bar-built lagoons can serve as important rearing areas for many fish and invertebrate species—including juvenile steelhead (Simenstad et al. 1982; Smith 1990; Robinson 1993; Martin 1995). Due to the combination of high prey abundance and seasonally warmer temperatures, juvenile steelhead that rear in lagoons have been found to achieve superior growth rates relative to upstream fish of the same cohort, and can therefore disproportionally represent future adult steelhead returns (Bond et al. 2008; Hayes et al. 2008). This is especially important considering that lagoon habitats often represent a fraction of the watershed area.

2.2.1.2 Coho Salmon Life History

The life history of the coho salmon in California has been well documented (Shapovalov and Taft 1954; Hassler 1987; Weitkamp et al. 1995). 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 salmon typically begin the immigration from the ocean to their natal streams after heavy late-fall or winter rains breach the sand bars at the mouths of coastal streams (Sandercock 1991). Coho salmon are typically associated with small to moderately-sized 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 (Sandercock 1991). Immigration continues into March, generally peaking in December and January, with spawning occurring shortly after arrival at the spawning ground (Shapovalov and Taft 1954).

When in freshwater, optimal habitats for coho salmon include adequate quantities of: (1) deep complex pools formed by large woody debris; (2) adequate quantities of water; (3) cool water temperatures[15]; (4) unimpeded passage to spawning grounds (adults) and back to the ocean (smolts); (5) adequate quantities of clean spawning gravel; and (6) access to floodplains, side channels and low velocity habitat during high flow events. Numerous other requirements exist (i.e., adequate quantities of food, dissolved oxygen, low turbidity, etc.), but in many respects these other needs are generally met when the six freshwater habitat requirements listed above are at a properly functioning condition.

The eggs generally hatch after four to eight weeks, depending on water temperature. Survival and development rates depend, in part, on fine sediment levels within the redd. Under optimum

[15] When maximum weekly average water temperatures exceed 18°C coho salmon are absent from otherwise suitable rearing habitat (Welsh et al. 2001); temperatures between 12-14° C are preferred; and the upper lethal limit is between 25-26°C.

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 (Baker and Reynolds 1986). McMahon (1983) found that egg and fry survival drops sharply when fines make 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). In the spring, as yearlings, juvenile coho salmon undergo a physiological process, or smoltification, which prepares them for living in the marine environment. Emigration timing is correlated with precipitation events and 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).

2.2.2 Status of the Listed Species

NMFS assesses four population viability[16] parameters to discern the status of the listed ESUs and DPSs and to assess each species ability to survive and recover. These population viability parameters are: abundance, population growth rate, spatial structure, and diversity (McElhany et al. 2000). While there is insufficient data to evaluate these population viability parameters quantitatively, NMFS has used existing information to determine the general condition of the populations in the S-CCC steelhead DPS, CCC steelhead DPS, and the CCC coho salmon ESU, and factors responsible for the current status of these listed species.

The population viability parameters are used as surrogates for numbers, reproduction, and distribution, which are included in the regulatory definition of "jeopardize the continued existence of" (50 CFR 402.02). For example, abundance, population growth rate, and distribution are surrogates for numbers, reproduction, and distribution, respectively. The fourth parameter, diversity, is related to all three regulatory criteria. Numbers, reproduction, and distribution are all affected when genetic or life history variability is lost or constrained, resulting in reduced population resilience to environmental variation at local or landscape-level scales.

2.2.2.1 CCC Steelhead DPS

Historically, approximately 70 populations of steelhead existed in the CCC steelhead DPS (Spence et al. 2008; Spence et al. 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

[16] NMFS defines a viable salmonid population as "an independent population of any Pacific salmonid (genus *Oncorhynchus*) that has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100- year time frame" (McElhany et al. 2000).

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). More recent estimates for the Russian River are on the order of 4,000 fish (NMFS 1997b). Abundance estimates for smaller coastal streams in the DPS indicate low but stable levels with recent estimates for several streams (Lagunitas, Waddell, Scott, San Vicente, Pudding, and Caspar creeks) of individual run sizes of 500 fish or less (62 FR 43937; August 18, 1997). 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 conditions has likely also depressed genetic diversity in these populations. For more detailed information on trends in CCC steelhead abundance, see Busby et al. 1996; NMFS 1997b; Good et al. 2005; Spence et al. 2008; Williams et al. 2011; and Williams et al. 2016.

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

The most recent status update concludes that steelhead in the CCC DPS remains "likely to become endangered in the foreseeable future", as new and additional information available since Williams et al. (2011) does not appear to suggest a change in extinction risk (Williams et al. 2016). In the most recent status review, NMFS concluded that the CCC steelhead DPS should remain listed as threatened (NMFS 2016a).

2.2.2.2 S-CCC Steelhead DPS

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 populations were estimated at 17,750 individuals (Good 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 systems in the DPS (Pajaro River, Salinas River, Carmel River, Little Sur River, and Big Sur River) are likely greatly 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 (Good et al. 2005) as few comprehensive or population monitoring programs are in place.

Analyses conducted by the S-CCC steelhead Technical Review Team (TRT) indicate 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 subpopulations. In the Carmel River there has been a fairly steady 15-year decline in abundance of anadromous adults (Williams et al. 2016). The decline has surprised researchers because it coincides with a concentrated effort to restore the habitat in the Carmel River and to improve numbers through a rescue/captive rearing operation (Williams et al. 2016). This decline could indicate an increase in S-CCC steelhead DPS extinction risk (Williams et al. 2016). NMFS's recovery plan (NMFS 2013) for the S-CCC steelhead DPS determined recovery of this DPS will require recovery of a minimum number of viable populations within each of four Biogeographic Population Groups – Interior Coast Range, Carmel River Basin, Big Sur Coast, and San Luis Obispo Terrace – within the S-CCC Steelhead Recovery Planning Area.

Although steelhead are present in most streams in the S-CCC DPS (Good et al. 2005), their populations are 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). 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). NMFS' 2005 status review concluded S-CCC steelhead remain "likely to become endangered in the foreseeable future" (Good et al. 2005). NMFS confirmed the listing of S-CCC steelhead as threatened under the ESA on January 5, 2006 (January 5, 2006; 71 FR 834).

In the most recent status update (Williams et al. 2016), 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 (Williams et al. 2011), and, therefore, S-CCC steelhead remain listed as threatened (Williams et al. 2016).

2.2.2.3 CCC Coho Salmon ESU

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. Historically, there were 11 functionally independent populations and 1 potentially independent population of CCC coho salmon (Spence et al. 2008, Spence et al. 2012). Most of the populations in the CCC coho salmon ESU are currently doing poorly as a result of low abundance, range constriction, fragmentation, and loss of genetic diversity, as described below.

Brown et al. (1994) estimated that annual spawning numbers of coho salmon in California ranged between 200,000 and 500,000 fish in the 1940s, which declined to 100,000 fish by the 1960s, followed by a further decline to 31,000 fish by 1991. More recent abundance estimates vary from approximately 600 to 5,500 adults (Good et al. 2005). Williams et al. (2011) indicated that CCC coho salmon are likely to continue to decline in number. 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 ESaU in which coho salmon were found for which there were no historical records. More recent genetic research has documented reduced genetic diversity within subpopulations of the CCC coho salmon ESU (Bjorkstedt et al. 2005). The influence of hatchery fish on wild stocks has likely also contributed to the lack of diversity through outbreeding depression and disease.

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

The CCC coho salmon ESU also includes coho salmon from the following conservation hatchery programs: the Russian River Coho Salmon Captive Broodstock Program at Don Clausen Fish Hatchery in Sonoma County, California, and the smaller Southern Coho Salmon Captive Broodstock Program at Kingfisher Flat Hatchery in the Scott Creek watershed, Santa Cruz County, California. While differing in size and funding, both programs were initiated in 2001 in response to severely depressed coho salmon abundances. Fish are collected from the wild, brought into the hatcheries, genetically tested, and spawned to maximize diversity and prevent inbreeding. In the hatchery, fish are raised to various ages, fed krill, tagged, and released into streams throughout the watersheds. This release strategy allows the fish to imprint on the creek with the aim that they will return to these streams as adults so they can spawn naturally. Juvenile coho salmon and coho salmon smolts have been released into several Russian River tributaries and coastal watersheds in San Mateo and Santa Cruz counties.

None of the five diversity strata defined by Bjorkstedt et al. (2005) currently support viable coho salmon populations. According to Williams et al. (2016), surveys suggest CCC coho salmon abundance has improved slightly since 2011 within several independent populations (mainly north of San Francisco Bay), although all populations remain well below their high-risk dispensation thresholds identified by Spence et al. (2008). The Russian River and Lagunitas Creek populations are relative strongholds for the species compared to other CCC ESU populations, the former predominantly due to out-planting of hatchery-reared juvenile fish from the Russian River Coho Salmon Captive Broodstock Program. The most recent status review (NMFS 2016a) documents conditions for CCC coho salmon have not improved since the last status review in 2011 (Williams et al. 2016). The overall risk of CCC coho salmon extinction remains high, and the most recent status review reaffirmed the ESU's endangered status (NMFS 2016a). NMFS's recovery plan (NMFS 2012b) for the CCC coho salmon ESU identified the major threats to population recovery. These major threats include roads, water diversions and impoundments, and residential development.

2.2.3 Status of CCC Steelhead, S-CCC Steelhead, and CCC Coho Salmon Critical Habitat

PBFs for CCC and S-CCC steelhead critical habitat within freshwater include:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development;
2. Freshwater rearing sites with:
   a) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
   b) Water quality and forage supporting juvenile development; and
   c) 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;
3. 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.

PBFs for CCC and S-CCC steelhead critical habitat within estuarine areas include: areas free of obstruction and excess predation with: water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

For 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 (64 FR 24049). Essential features (or PBFs as discussed above) for coho salmon include adequate: (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions (64 FR 24049).

The condition of CCC steelhead, S-CCC steelhead, and CCC coho salmon critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that currently depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat[17]: logging, urban and agricultural land development, mining, stream

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

channelization, and bank stabilization, dams, wetland loss, and water withdrawals (including unscreened diversions for irrigation). Habitat impacts of concern include altered streambank and channel morphology, elevated water temperature, lost spawning and rearing habitat, habitat fragmentation, impaired gravel and wood recruitment from upstream sources, degraded water quality/quantity, lost riparian vegetation, and increased sediment delivery into streams from upland erosion (Weitkamp et al. 1995; Busby et al. 1996; 64 FR 24049; 70 FR 37160; 70 FR 52488). Based on NMFS familiarity with the landscapes in which these critical habitats occur, these impacts continue to persist today. Widespread diverting of rivers and streams, as well as the pumping of groundwater hydraulically connected to streamflow, has dramatically altered the natural hydrologic cycle in many of the streams within the CCC and S-CCC steelhead DPSs and CCC coho ESU which can delay or preclude migration and dewater aquatic habitat. Stream channelization, commonly caused by streambank hardening and stabilization, represents a very high threat to instream and floodplain habitat throughout much of the designated critical habitat for these three species, as detailed within the CCC coho salmon, CCC steelhead, and S-CCC steelhead recovery plans (NMFS 2012b, 2016b, and 2013, respectively). Streambank stabilization confines stream channels and precludes natural channel movement, resulting in increased streambed incision, reduced habitat volume and complexity. Overall, the current condition of CCC steelhead, S-CCC steelhead, and CCC coho salmon critical habitat is degraded, and does not provide the full extent of conservation value necessary for the recovery of the species.

The CZU Lightening Complex started as a series of lightening fires on August 16, 2020 across western Santa Cruz and San Mateo counties (California Department of Forestry and Fire Protection [Cal Fire] and California Department of Conservation [CDC] 2020). The fire was fully contained on September 22, 2020, but burned a total of 86,509 acres. Portions of the burned area represented some of the highest quality habitat for salmonids in the Santa Cruz Mountains. Much of the burned areas in Santa Cruz County burned at low-intensities, and in areas with predominately redwood forest, most of the larger trees survived (Cal Fire and CDC 2020). Future winter storms may transport large quantities of ash, debris, and fine sediments into areas downslope from burned areas, in the near future.

Published work has identified storm water from roadways and streets as causing a high percentage of rapid mortality of adult coho salmon in the wild (Scholz et al. 2011) and laboratory settings (McIntyre et al. 2018). Subsequent laboratory studies showed this morality also occurred in to juvenile coho salmon (Chow et al. 2019) as well as to juvenile steelhead and chinook salmon (Brinkmann et al. 2022, McIntyre and Scholz, unpublished results, 2020). Recent publications have identified a degradation product of tires (6PPD-quinone) as the causal factor in this mortality at concentrations of less than a part per billion (Tian et al. 2022, Brinkmann et al. 2022, Tian et al. 2020; Peter et al. 2018). This contaminant is widely used by multiple tire manufacturers and the tire dust and shreds that produce it have been found to be ubiquitous where both rural and urban roadways drain into waterways (Sutton et al. 2019; Feist et al. 2018).

2.2.4 Global Climate Change

Another factor affecting the rangewide status of CCC steelhead, S-CCC steelhead, and CCC coho salmon and 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). Snowmelt from the Sierra Nevada has declined (Kadir et al. 2013). However, total annual precipitation amounts have shown no discernable change (Kadir et al. 2013). CCC steelhead, S-CCC steelhead, and CCC coho salmon 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 and coho salmon experience, and many of these factors have much less influence on steelhead abundance and distribution than human disturbance across the landscape. In addition, CCC steelhead, S-CCC steelhead, and CCC coho salmon, in the Santa Cruz Mountains, are not dependent on snowmelt driven streams and thus not affected by declining snow packs.

The threat to CCC steelhead, S-CCC steelhead, and CCC coho salmon from global climate change is expected to 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 and the magnitude and frequency of dry years may increase (Lindley et al. 2007; Schneider 2007; Moser et al. 2012). Similarly, wildfires are expected to increase in frequency and magnitude (Westerling et al. 2011; Moser et al. 2012).

In the San Francisco Bay region[18], 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 experience a higher degree of variability of annual precipitation during the next 50 years and years that are drier than the historical annual average during the middle and end of the twenty-first century. 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 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 periods, climate conditions not caused by the human addition of

[18] Both the San Francisco Bay and Monterey Bay regions exhibit similar Mediterranean climate patterns. The action areas are located within the Monterey Bay region.

carbon dioxide to the atmosphere are more likely to predominate (Cox and Stephenson 2007; Smith et al. 2007; Santer et al. 2011).

Finally, climate change is also affecting water circulation and temperature patterns in the marine environment. In fall 2014, and again in 2019, a marine heatwave, known as "The Blob"[19], formed throughout the northeast Pacific Ocean, which greatly affected water temperature and upwelling from the Bering Sea off Alaska, south to the coastline of Mexico. The marine waters in this region of the ocean are utilized by salmonids for foraging as they mature (Beamish 2018). Although the implications of these events on salmonid populations are not fully understood, they are having considerable adverse consequences to the productivity of these ecosystems and presumably contributing to poor marine survival of salmonids.

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 includes all waterways and adjacent lands in Santa Cruz County where Program activities will occur. Santa Cruz County encompasses 284,930 acres and is located between San Francisco Bay and Monterey Peninsula along the central coast of California. The RCD works primarily on private lands although the RCD has performed some work in State Parks lands and Soquel State Demonstration Forest.

Major watersheds in Santa Cruz County include the San Lorenzo River, Scott, Soquel, Aptos, and Waddell creeks, and the Corralitos and Salsipuedes subbasins of the Pajaro River. Smaller watersheds in the County include Arana Gulch, Rodeo Gulch, and the North Coast streams of San Vicente, Molino, Liddell, Laguna, Davenport, Majors, San Andreas, Baldwin, and Wilder creeks. Associated waterways and land uses within Santa Cruz County watersheds are described in detail in the biological assessment (Corps 2011).

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).

[19] https://www.fisheries.noaa.gov/feature-story/new-marine-heatwave-emerges-west-coast-resembles-blob

2.4.1 Status of the Species in the Action Area

2.4.1.1 CCC Coho Salmon

Historically, CCC coho salmon were believed to inhabit all or most of the accessible coastal streams in Santa Cruz County. By the 1960s CCC coho salmon were believed present in seven populations in Santa Cruz County including the San Lorenzo River System (Bryant 1994). More recently, observations of coho salmon in the San Lorenzo River watershed have been scarce.

Wild or hatchery strays from the Southern Coho Salmon Captive Broodstock Program have the potential to enter and spawn in Santa Cruz County streams in any given year. NOAA's Southwest Fisheries Science Center (SWFSC) operates a passive integrated transponder tag (PIT-tag) antenna array at the Felton Diversion Dam on the San Lorenzo River, located just downstream of the confluence with Fall Creek. Since the winter of 2016-17, a small number of tagged hatchery-origin adults have been detected at the antenna each year (Table 2).

Table 2. Number of PIT-tagged coho salmon detected at the Felton Diversion Dam antenna during the winters of 2016-17 through 2019-20. Source: Southwest Fisheries Science Center.

Winter	Number of coho salmon detected
2016-17	1
2017-18	1
2018-19	9
2019-20	2

There is little evidence that coho salmon have reproduced successfully in the San Lorenzo River watershed over the last 30 years. Although adults are occasionally captured and released at the Felton Diversion Dam during the winter spawning season, juvenile coho salmon have not been observed in the watershed since 2005. Prior to this observation, the last credible report of successful coho salmon reproduction in the watershed occurred in 1981. The San Lorenzo River population is identified as an independent population in the federal coho salmon recovery plan and the reintroduction of fish from the captive broodstock program to tributaries of the San Lorenzo River will be central to successful recovery of coho salmon in the Santa Cruz Mountains Diversity Stratum (SCMDS) over the long term.

In the Scott Creek watershed, the status of the coho salmon population is well documented due to the operation of a life cycle research and monitoring station by the NOAA SWFSC and the University of California Santa Cruz since 2003. This comprehensive monitoring program has produced a time-series of key viability metrics including abundance, productivity, spatial structure, and diversity. Recent escapement of coho calmon to Scott Creek since winter 2002–2003 has ranged from a high of 329 adults in 2004–2005, to a low of one returning adult in both 2009–2010 and 2011–2012. The coho salmon population in this watershed has been classified as a historically dependent population (Bjorkstedt et al. 2005), indicating that its dynamics and long-term persistence were likely dependent on recruits from other populations in the SCMDS.

Although there is a lack of contemporary data on adult returns to the Waddell Creek watershed, juvenile surveys conducted annually since 1992 indicate that recruitment has been extremely poor over the past 12 years and all three coho salmon broodlines are likely functionally extirpated (Smith 2020; NMFS 2012b). Also, small numbers of adult coho salmon have been detected in Waddell Creek each winter since 2014–2015 via stationary PIT tag antenna arrays in the lower basin (J. Kiernan, SWFSC, *unpublished data*). The coho salmon population in this watershed was historically dependent on adult recruits from other populations in the diversity stratum.

Classified as a dependent watershed in the NMFS (2012) final coho salmon recovery plan, San Vicente is the only watershed in the diversity stratum (other than Scott Creek and Waddell Creek) with an extant population of coho salmon, albeit at exceptionally low abundance. Coho salmon are also present in Laguna and Majors creeks.

Fish from the captive broodstock program have intermittently been outplanted to San Vicente Creek over the past decade principally as yearlings. Recently however, multiple life stages (i.e., unfed fry, yearlings and adults) have been released in some years. Annual estimates of coho salmon escapement to San Vicente Creek have ranged between 0 and 65 individuals as estimated from redd surveys conducted between 2012 and 2018 (Pacific States Marine Fisheries Commission, *unpublished data*). The coho salmon population in this watershed was historically dependent on recruits from other populations in the diversity stratum.

While both adult and juvenile coho salmon have been reported in Soquel Creek during the last decade, their presence is rare and attributed to straying from Scott Creek. It is unlikely that a viable coho salmon population has existed in the watershed for at least 50 years. The coho salmon population in this watershed was historically dependent on recruits from other populations in the diversity stratum. Coho salmon have not been observed in the Aptos Creek watershed since the early 1970s.

Although the occurrence of juvenile coho salmon would be rare, there is potential for small numbers of fish to be present during implementation of the Program's practices. However, based on the information discussed above and no observations of coho salmon in Program project areas since 2005, we expect only a very small number of CCC coho salmon would be present in Program project areas during Program activities in the next 10 years.

2.4.1.2 CCC Steelhead

Steelhead are present in most of Santa Cruz County's streams that are accessible from the ocean including Waddell Creek, Scott Creek, San Vicente Creek, Laguna Creek, Majors Creek, Baldwin Creek, Wilder Creek, the San Lorenzo River, Arana Gulch, Rodeo Gulch, and Soquel Creek (California Natural Diversity Database 2003). The San Lorenzo River watershed supports one of the largest steelhead populations within the Santa Cruz Mountains Diversity Stratum

(NMFS 2016b). This population is functionally independent and likely provides frequent dispersal to nearby smaller coastal populations. Recovery criteria for the CCC steelhead San Lorenzo River population is a spawner density target of 3,200 (NMFS 2016b).

2.4.1.3 S-CCC Steelhead

Casserly Creek, Corralitos Creek, and Brown's Valley Creek all support a population of S-CCC steelhead. The most recent estimate of steelhead population size (Nehlsen et al. 1991) indicate the Pajaro River population has declined significantly. McEwan and Jackson (1996) reported adult run estimates of 1,500, 1,000, and 2,000 in the Pajaro River for the years of 1964, 1965, and 1966, respectively. Nehlsen et al. (1991) estimated adult escapement in the Pajaro River at less than 200, and the primary factor cited as the cause of decline was habitat destruction. The non-tidal portion of the Pajaro River does not support spawning or summer rearing habitat (Smith 1993; Smith 2007). Summer rearing in the Pajaro River is limited by high water temperatures, fine channel substrate, and low stream flow. The Pajaro River lagoon is primarily a spring and early summer rearing and acclimation zone for emigrating steelhead smolts prior to ocean entry, and a migratory path for adults to and from spawning habitat in the basin.

The estimated number of salmonids present in the action area and the rationale used to derive these population estimates per stream are discussed in NMFS (2012b). In brief, this was based on documented densities or abundancies of salmonids and habitat conditions. Table 3 summarizes the population densities of CCC coho salmon, CCC steelhead, and S-CCC steelhead. Due to the low abundance of coho salmon in the action area and the unequal distribution of coho salmon in streams, NMFS and the RCD expect no more than 100 coho salmon juveniles will need to be relocated during the Program (2022-2031), with a maximum of 10 juvenile coho salmon per year.

Table 3. Estimated densities of juveniles CCC/S-CCC steelhead and coho salmon, Santa Cruz County.

ESU/DPS	Density Estimate (fish per foot)
CCC coho salmon	<0.21[20]
CCC steelhead	0.43
S-CCC steelhead	0.46

2.4.2 Status of Critical Habitat in the Action Area

The action area is designated critical habitat for CCC steelhead, S-CCC steelhead, and CCC coho salmon, and supports spawning, rearing, and migration of these listed species. PBFs include substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions.

[20] Previous juvenile density estimates for the 2005-2009 biological opinion were estimated at 0.21 fish per foot based on historical information. No coho salmon were found from 2005-2021 activities conducted under the Program. We do not expect a rapid or significant change in the near future, and therefore assume this density estimate will likely be less than 0.21 fish per foot.

The current condition of most salmonid habitat, including critical habitat, in Santa Cruz County streams is degraded from conditions that are known to support robust populations of salmon and steelhead. Some areas of adequate habitat remain, along with a few areas of good quality. Table 4 summarizes the condition of coho salmon and steelhead habitat in Santa Cruz County streams.

Table 4. Summary of Habitat Condition for Coho salmon and Steelhead in Santa Cruz County Watersheds[21]

Watershed	Spawning Habitat	Juvenile Rearing Habitat
Waddell Creek	Good quality habitat for both coho salmon and steelhead. Waddell and Scott considered the best spawning habitats for anadromous species south of San Francisco. However spawning habitats are compromised by sedimentation and high levels of embeddedness.	Sub-adequate pool habitat, shelter habitat, and floodplain connectivity are major limiting factors articulated in the Final Recovery Plan for Central California Coast coho salmon Evolutionarily Significant Unit (NMFS 2012).
Scott Creek	Good quality habitat for both coho salmon and steelhead. Coho salmon habitat under-utilized. Waddell and Scott considered the best spawning habitats for anadromous species south of San Francisco. However, habitats are compromised by sedimentation and high levels of embeddedness.	Sub-adequate pool habitat, shelter habitat, and floodplain connectivity are major limiting factors articulated in the Final Recovery Plan for Central California Coast coho salmon Evolutionarily Significant Unit (NMFS 2012).
San Vicente Creek	Areas of good quality habitat exists for both coho salmon and steelhead, though recent observations indicate that spawning gravels may be insufficient to support both species.	Rearing habitat for juvenile steelhead and coho salmon appear to be adequate. The lower reaches do contain deep pools and LWD, recent work on backwaters and future work to increase LWD should improve rearing conditions for coho salmon.
Laguna Creek	Spawning habitat quality varies.	Rearing habitat for juvenile steelhead is adequate.
Majors (Coja) Creek	Spawning habitat for steelhead limited- gravels for steelhead scarce.	Rearing habitat poor for steelhead (better for resident trout in upstream sections).
Baldwin Creek	Salmonid spawning habitat exists, fair condition with large-sized substrate.	Juvenile rearing habitat apparently abundant and of high quality.

[21] Based on review of Shapovalov and Taft 1954; Smith 1990; Bryant 1994; Titus et al. 2002; Swanson Hydrology & Geomorphology; D.W. Alley and Associates 2002; Hagar 2003; NMFS 2013.

Watershed	Spawning Habitat	Juvenile Rearing Habitat
San Lorenzo River and Tribs	Spawning habitat quality varies throughout watershed. In general, spawning conditions are considered to be sub-optimal in the San Lorenzo River. Lower and middle San Lorenzo River have poor spawning conditions due to the input of high fine sediment loads from tributary streams. High quality spawning habitat occurs in localized patches in tributaries.	Juvenile production more limited by restricted rearing conditions resulting from low summer streamflow, shallow pool conditions, and the absence of good escape cover. In the middle and lower River, excessive fine sediment loads have resulted in high embeddedness in riffles and runs and a general loss of total habitat area. Rearing conditions remain adequate to support a high proportion of fast growing juveniles. In the upper River and tributaries, cooler temperatures and low primary productivity result in slow growing salmonids in the tribs. The dominant limiting factor for juvenile production is the presence of excessive sediment without enough large woody material to act as scour objects, thus reducing habitat depth and available escape cover.
Arana Gulch	Spawning habitat considered to be extremely poor. Substrate at the tails of pools where spawning would be likely is primarily comprised of silt and fine sand.	Rearing habitat generally limited due to shallow pool depths, lack of scour objects such as bedrock and large boulders.
Soquel Creek	Spawning habitat variable- extremely mobile streambed conditions result in low spawning success (washing away or burying spawning redds). High embeddedness in riffle and run habitat.	Rearing habitat generally poor for coho salmon due lack of LWD and pools and low summer baseflow. Juvenile steelhead rearing habitat is generally poor due to lack of LWD and low summer baseflow.
Aptos Creek	Quantity and quality are good to very good for coho salmon.	Depth and shelter of pools, frequency of LWD, floodplain connectivity, and estuary function are poor for coho salmon.
Pajaro River and tributaries	Some favorable spawning areas in small portions of some tribs: upper Corralitos, Shingle Mill Gulch, and Rattlesnake Gulch.	Quality of habitat for juvenile rearing limited to portions of upper reaches of tribs: Corralitos, Shingle Mill Gulch, and Rattlesnake Gulch.

The long-term effects of climate change have been presented above, and include changes to air and water temperature and the timing and magnitude of precipitation events that may affect steelhead, coho salmon, and critical habitat by changing water quality, streamflow levels, and salmonid migration in the action area. The threat to salmonids in the action area from climate change is likely to mirror what is expected for the rest of Central California. NMFS expects that average dry season air temperatures in the action area will continue to increase, heat waves will become more extreme, and droughts and wildfire will occur more often (Hayhoe et al. 2004; Lindley et al. 2007; Schneider 2007; Westerling et al. 2011; Moser et al. 2012; Kadir et al. 2013). Many of these changes are likely to further degrade CCC steelhead, S-CCC steelhead, and CCC coho salmon critical habitat within the action area by, for example, reducing streamflow during the dry season and raising summer water temperatures.

Such changes to the regional climate could also lead to drier forest conditions and an increased threat of wildfires. As noted above, the CZU Lightening Complex burned 86,509 acres across western Santa Cruz and San Mateo counties. An increase in frequency of such events could reduce canopy cover, large wood recruitment, and increase fine sediment yield to streams within the action area, which would have some adverse consequences on the PBFs for spawning and rearing habitats.

2.4.3 Previous ESA Section 7 Consultations and Section 10(a)(1)(A) Permits in the Action Area

As noted in the **Consultation History** section above, on May 31, 2005, NMFS issued a conference and biological opinion to NRCS to implement conservation practices in Santa Cruz County. On July 18, 2006, NMFS issued an amended biological opinion to NRCS to implement conservation practices in Santa Cruz County. In the conference and amended biological opinion, NMFS concluded that the Countywide Partners in Restoration Permit Program would not jeopardize listed salmonids or adversely modify their critical habitats. A five-year Evaluation of the Santa Cruz Countywide Partners in Restoration Permit Coordination Program report (Table 5) described the outcomes of the program, the number of projects implemented, the volumes of sediment retained, and the number of miles of salmonid habitat improved in Santa Cruz County. The implementation of the 2005-2009 Program resulted in 73 projects that improved approximately 20 miles of salmonid habitat and reduced 7,900 tons of sediment entering the streams during the lifetime of the Program.

Table 5. Summary of Practices Implemented Under the Program from 2005-2009

	Practice (NRCS Field Office Technical Guide Practice Code)	# of sites practice implemented	Acres Restored	Total Annual Yards Sediment Saved	Miles of Salmonid Habitat Improved
1	Access Road Improvement (560)	14	-	775	-
2	Critical Area Planting (342)	16	-	-	-
3	Diversion (362)	0	-	-	-
4	Filter Strip (393)	0	-	-	-
5	Stream Habitat Improvement and Management (395)	6	-	-	19
6	Grade Stabilization Structure (410)	1	0.1	20	-
7	Grassed Waterway (412)	3	2	600	-
8	Obstruction Removal	3	-	-	0.05
9	Pipeline (516)	0	-	-	-

	Practice (NRCS Field Office Technical Guide Practice Code)	# of sites practice implemented	Acres Restored	Total Annual Yards Sediment Saved	Miles of Salmonid Habitat Improved
10	Restoration and management of Declining Habitats (643)	12	87.3	-	-
11	Sediment Basins (350) [with or without water control (638)]	4	0.77	148	-
12	Streambank Protection (580)	5	0.2	6026	-
13	Stream Channel Stabilization (584)	0	-	-	-
14	Structure for Water Control (587)	9	252	-	-
15	Underground Outlet (620)	0	-	-	-

On March 8, 2012[22], NMFS issued a biological opinion to the Corps to permit the RCD to implement conservation practices in Santa Cruz County. In the biological opinion, NMFS concluded that the Countywide Partners in Restoration Permit Program would not jeopardize listed salmonids or adversely modify their critical habitats.

In the 10-year period from 2010-2019 (effects on ESA listed species were assessed in three biological opinions: 2005, 2006-2009 and 2012-2021), 57 projects were successfully implemented under the Program, of which 43 were within waters of the U.S. A total of 1,491 juvenile steelhead were captured and relocated during dewatering activities with 11 mortalities (RCD 2021). The primary practices utilized for the last 10 years of this program were Planting, Access Road Improvement, Restoration and Management of Declining Habitats, and Structure for Water Control. These practices were utilized on 12, 38, 20 and 29 sites respectively. Obstruction Removal, Wetland Management and Stream Habitat Improvement and Management were each used on 10 sites. Streambank Protection, Stream Channel Stabilization and Sediment basins were used on 9, 8 and 6 sites respectively. Grade Stabilization Structure, Grassed Waterway and Underground Outlet were used once on each site and Stream Crossing and Upland Wildlife Habitat Management were not used at all over the 10-year period. A summary of all practices and the number of sites at which they were implemented is listed below in Table 6.

Access Roads Improvements (in combination with Structure for Water Control) were installed in partnership with rural road associations with the assistance of funding provided under the RCD's Rural Roads Program. In addition, sediment basins captured agriculturally derived sediment and protected wildlife habitat. These projects resulted in more than 12,000 tons per acre per year of

[22] Between the expiration of the 2006 biological opinion and the issuance of the 2012 biological opinion, fish-related projects implemented in 2010 and 2011 were covered under the NOAA Restoration Center's programmatic biological opinion.

sediment from impacting water quality, predominantly in the San Lorenzo River, Pinto Lake, and Pajaro watersheds. Almost 10 miles of salmonid habitat was improved throughout Santa Cruz County utilizing the Fish Stream Habitat Improvement and Management and Streambank Protection practices. More than 90 acres of habitat was restored with the Restoration and Management of Declining Habitats and Planting practices, focusing on Watsonville Slough, Soquel, Scotts and San Vicente Creek and tributaries to the San Lorenzo River, which provides habitat for the steelhead, coho salmon and other listed species.

Table 6. Number of practices implemented from 2012-2019. Note: Multiple practices were often implemented at a project site to achieve environmental benefit.

	Practice (NRCS Field Office Technical Guide Practice Code)	# of sites practice implemented
1	Access Road Improvement (560)	12
2	Planting (342), (612) and (391)	38
3	Grade Stabilization Structure (410)	1
4	Grassed Waterway (412)	1
5	Obstruction Removal	10
6	Restoration and management of Declining Habitats (643)	20
7	Sediment Basins (350) [with or without water control (638)]	6
8	Streambank Protection (580)	9
9	Stream Channel Stabilization (584)	8
10	Structure for Water Control (587)	29
11	Wetland Management (657), (659), (356),(644)	10
12	Stream Habitat Improvement and Management[1]	10
13	Stream Crossing (578) [2]	0
14	Underground Outlets (620)	1
15	Upland Wildlife Habitat Management (645), (382), (614), (516)	0

NMFS's North Central Coastal California Office conducts numerous informal and formal section 7 consultations in Santa Cruz County each year. The majority of these consultations were informal consultations that did not adversely affect listed species. A low number (less than 5) of formal biological opinions are issued each year that authorize take and have terms and conditions that minimize take of listed anadromous fish. There has not been a jeopardy or adverse modification of critical habitat biological opinion issued by NMFS in Santa Cruz County.

NMFS has issued section 10(a)(1)(A) research and enhancement permits and section 4(d) limits or exceptions for scientific research and monitoring that occur in the action area. Salmonid monitoring approved under these programs includes carcass surveys, smolt outmigration trapping, and juvenile density surveys. In general, these activities are closely monitored and require measures to minimize take during the research activities. NMFS determined these research activities are unlikely to affect future adult returns.

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 (see 50 CFR 402.02). 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 the factors set forth in 50 CFR 402.17(a) and (b).

The Program is expected to implement up to five conservation practices per year: three instream projects and two upland sediment detention basins.[23] The purpose of many of these practices is to improve habitat for listed salmonids. However, there is the potential for adverse effects to listed salmonids and temporary adverse effects to their habitat, including critical habitat.

Potential impacts to CCC coho salmon, CCC and S-CCC steelhead and their critical habitat from the Program are described below. Specific impacts associated with each practice are summarized in Table 7 and are followed by a general discussion of potential impacts organized by activities.

Table 7. Summary of Effects to Listed Species and Critical Habitat

Practice Name (NRCS Field Office Technical Guide Practice Code)	Beneficial Effects to Salmonids and/or Salmonid Habitat	Adverse Effects to Salmonids and/or Salmonid Critical Habitat
1. Access Roads (Improvement) (560)	Decreases yield of sediment and attached substances; traps sediments to improve downstream water quality.	Temporary increases in sedimentation during construction.
2. Planting (342, 612, 422, 391)	Stabilizes soil, reduces damage from sediment and runoff to downstream areas, improves riparian habitat; can improve vegetative canopy. Decreases yield of sediment and attached substances; traps sediments to improve downstream water quality.	None anticipated.

[23] The estimate for conservation practices is based on project need, landowner demand, and previous experience in the Santa Cruz County watersheds. The number of projects in the Program may vary over the next 10 years yet the maximums described are limited by the capacity of RCDSCC for project management and implementation.

Practice Name (NRCS Field Office Technical Guide Practice Code)	Beneficial Effects to Salmonids and/or Salmonid Habitat	Adverse Effects to Salmonids and/or Salmonid Critical Habitat
3. Stream Habitat Improvement and Management (395)	Improvements include the creation of pools and backwaters or modifications to the stream channel to improve fish passage to upstream spawning and rearing habitats. Restoration of access to stream areas currently blocked by flashboard dams and other structures.	Modification of logjams, increased turbidity during construction, and temporary dewatering of channels could result in adverse effects to critical habitat as well as stress to individuals and mortality from relocation activities.
4. Stream Crossing (578)	This practice will not benefit salmonids.	Potential for mortality during dewatering and relocation activities. Habitat disturbance until practice is fully installed. Temporary increases in sedimentation during construction. Potential small increase in shading caused by a new bridge.
5. Grade Stabilization Structure (410)	Decreases yield of sediment and attached substances.	None anticipated.
6. Grassed Waterway (412)	Decreases yield of sediment and attached substances; traps sediments to improve downstream water quality.	None anticipated.
7.Obstruction Removal (500)	Removes objects such as trash, abandoned automobiles and appliances, and other objects that degrade the salmonid habitat and/or water quality.	Potential for mortality during dewatering and relocation activities. Temporary increases in turbidity during construction and disturbance of riparian habitat. Potential for release of trapped fluids (from cars) during removal.
8. Restoration and Management of Rare and Declining Habitats (643)	Removal of exotic invasives and replacement with native vegetation improves overall habitat quality. Could result in an increase in water quantity in summer low-flow periods (e.g., removal of *Arundo donax*).	Modification of logjams, increased turbidity during construction, and temporary dewatering of channels could result in temporary adverse effects to critical habitat. Dewatering and relocation of fish could stress fish and result in mortality. Potential of herbicides to cause adverse effects.

Practice Name (NRCS Field Office Technical Guide Practice Code)	Beneficial Effects to Salmonids and/or Salmonid Habitat	Adverse Effects to Salmonids and/or Salmonid Critical Habitat
9. Sediment Basins (350) [with or without water control (638)]	Decreases yield of sediment and attached substances; traps sediments to improve downstream water quality.	None anticipated.
10. Stream bank Protection (580)	Stabilizes soil, reduces damage from sediment and runoff to downstream areas, improves riparian habitat; can improve vegetative canopy.	Potential for mortality during dewatering and relocation activities. Potential for adverse effects to individual fish and critical habitat by removal of earthen banks and replacement with rock riprap or other bank hardening materials. This would result in permanent loss of habitat (potentially harming fish trying to rear near stabilized banks) and affect watershed processes. Habitat disturbance until practice is fully installed. Temporary increases in sedimentation during construction.
11. Stream Channel Stabilization (584)	Decreases yield of sediment and attached substances; improves downstream water quality.	Some permanent loss of habitat function via loss of natural channel morphology processes. Habitat disturbance until practice is fully installed. Temporary increases in sedimentation during construction.
12. Structure for Water Control (587)	This practice will reduce chronic bank erosion from road and drainage culverts. Depending on the structure, fish passage may also be improved.	Temporary increases in sedimentation during construction leading to increased turbidity which could potentially adversely affect juvenile salmonids.
13. Underground Outlets (620)	Practice may be associated with sediment basins. Decreases yield of sediment and attached substances; reduced erosion to improve downstream water quality.	None anticipated.

Practice Name (NRCS Field Office Technical Guide Practice Code)	Beneficial Effects to Salmonids and/or Salmonid Habitat	Adverse Effects to Salmonids and/or Salmonid Critical Habitat
14. Wetland Management (657, 659, 356, 587, 644)	Improvement of wetlands and restoration of wetlands on currently farmed or developed lands may result in improved water quality conditions for receiving waters.	None anticipated.
15. Upland Wildlife Habitat Management (645, 382, 614, 516)	This practice focuses on creation, restoration, and/or enhancement of upland habitat for wildlife species (i.e Ohlone Tiger Beetle). This practice may be used to install shelter, cover, and food, establish vegetation for shelter, food, and enable movement, and for manipulating vegetation to sustain optimal habitat conditions for upland species. The practice, if implemented in fish-bearing watersheds could result in greater run- off infiltration rates, reduced runoff velocity, and reduced sheet erosion or rilling. This would benefit salmonid habitat via reduced sediment delivery.	None anticipated.

Conservation Practices 2 (planting), 5 (grade stabilization), 6 (grassed waterway), 9 (sediment basins), 13 (underground outlets), 14 (wetland management), and 15 (upland wildlife management) (Table 7) are either upslope or do not occur in salmonid bearing streams and are anticipated to improve overall salmonid habitat conditions by reducing sedimentation. Due to the limited number of projects per year, their minor impacts on the environment, or their location in non-salmonid habitat, NMFS expects these practices, individually or in combination with the other practices in this proposed Program, are unlikely to cause more than negligible effects to listed salmonids or their critical habitat. For example, even though the installation of a grade stabilization structure in a gully during the dry season may somewhat temporarily increase sediment entry to the gully via disturbed ground when the first fall/winter rains occur after construction, the overall contribution of sediment from the gully to salmonid waters downstream will be reduced because the stabilization structure will prevent far more sediment from moving downstream from long-term erosion within the gully.

NMFS' analysis of Conservation Practices 1 (access roads), 3 (stream habitat improvement and management), 4 (stream crossing), 7 (obstruction removal), 8 (restoration and management of rare and declining habitats), 10 (stream bank protection), 11 (stream channel stabilization), and 12 (structure for water control) (Table 7) identified the following likely adverse effects to listed salmonids and critical habitat: loss of instream cover and riparian shade; dewatering of stream reaches and fish relocation activities; turbidity and sedimentation; toxic chemicals; changes to channel morphology; and, beneficial effects of the Program.

2.5.1 Loss of Instream Cover and Riparian Shade

Under the Program, logjams may be modified or removed a maximum of two times per year if they pose an immediate threat of destabilizing a bank. Modification or removal of logjams has the undesirable effect of removing large wood from stream habitat. Large wood is a critical habitat constituent for both steelhead and coho salmon. It performs many functions including providing refugia for salmonids, providing locations for deposition of spawning gravel, acting as obstructions to flow, causing local scour that influences channel morphology, contributing to the creation of pools and bars, and functioning as natural grade control, all of which are important habitat constituents for salmonids.

Modification of logjams has the undesirable effects of removing large woody debris from the stream habitat (Wyzga et al. 2009) and displacing fish to less desirable habitat. As described in the **Environmental Baseline** section of this biological opinion, steelhead and coho salmon require essential habitat features in order to survive. Large wood is a critical structural component in freshwater habitat formation for both steelhead and coho salmon and increases the quality of the habitat. Large wood performs many functions including: 1) providing cover and refugia for juvenile and adult steelhead and coho salmon; 2) providing locations for deposition of spawning gravel; 3) acting as obstructions to flow causing local scour that influences channel morphology including contributing to the creation of pools and bars; and 4) functioning as natural grade control, all of which are important habitat features for salmonids (Gurnell et al. 2002). Large wood beneficially influences aquatic ecosystems by providing habitat for many groups of invertebrates and fish, acts as a food source for aquatic biota, improves retention of organic matter in the channels, and increases overall habitat complexity (Harmon et al. 1986; Gurnell et al. 2002; Gregory et al. 2003). Pools are the primary refuge for rearing juvenile coho salmon and steelhead during summer low flow periods when ambient air temperatures are high. Pool abundance is directly associated with large wood abundance (Rosenfeld and Huato 2003, Thompson 2008) in smaller streams compared to larger riverine systems where LWD plays less of a roll in pool formation. Following a modification of a logjam, a decrease in juvenile salmonid abundance in the immediate area can occur due to diminished habitat quality and reduced carrying capacity (Hicks et al. 1991).

Modifying or removing logjams may affect salmonid habitat. Newly formed woody debris habitat that forms from materials cut up or winched out of a logjam will likely be diminished in quality and extent than if the logjam was not modified. Potential effects to the PBFs include the diminishment of habitat at project sites when key pieces are cut into smaller sizes, as they will be less likely to maintain an existing stable wood structure. In some cases, the modification may create small pieces that may mobilize during high flow events. Structures that form downstream from smaller pieces of wood are more likely to mobilize under moderate and high flow events, which reduce their overall habitat value for salmonids. Habitat values downstream of the project site will change through a reduction in the quantity of quality spawning, rearing, and staging habitat. In general, it is anticipated that logjams would be ultimately replenished during large storm events when trees from upstream locations are periodically recruited into the stream channel. However, given the uncertainty of when and where large storm replenishment will occur, it is not relied upon in this analysis to mitigate the loss of the large wood structures. The effects of the Program to the coho salmon and steelhead spawning and rearing habitat in the project area are anticipated to be minor because of the limited extent of logjam modification sites compared to the total miles of spawning and rearing habitat in the action area. The complete removal of a log jam is likely to adversely affect individual salmonids primarily due to loss of cover when no other similar habitat is located in the vicinity. These fish are likely to be exposed to higher rates of predation, for example. Losses of juvenile fish due to reduction in habitat quality are expected to be limited to very small numbers of fish because of the extensive amount of habitat available elsewhere within the watershed. Although there will be some diminishment in the value of the habitat at the project site, long-term permanent effects to critical habitat in the County are not expected because functional wood will still be retained in the County and only a small portion of critical habitat in the action area will be affected. The effects to spawning and rearing PBFs will be minor because the lineal feet of projects will be minimal.

Removal of streamside vegetation may be required for installation of some of the practices covered under the Program. Loss of riparian vegetation can result in increased water temperature, reduced inputs of terrestrial-based prey into the channel and increased erosion potential. The amount of riparian vegetation that would be removed makes up a very small portion of riparian vegetation throughout the action area. If juvenile salmonids are rearing in areas where riparian vegetation is removed, they may leave the area to find suitable riparian cover and shade nearby. Riparian vegetation lost during the installation of practices covered under the Program will be revegetated by the RCD with native riparian trees and shrubs. The RCD proposes to replace vegetation and monitor the revegetated areas to ensure success. In addition, it is anticipated that many of the areas where these practices will be installed have already been degraded (e.g., failing slopes with limited vegetation), thus necessitating installation of such measures proposed under the Program. The Program will include removal of invasive, nonnative plant species, which would ultimately improve streamside habitat and replant critical areas with native plants. Revegetation with native riparian trees and shrubs is expected to improve water quality by increasing canopy cover, stabilize streambanks, and filter fine sediment from entering the stream, once revegetation reaches maturity. Revegetation is expected to reach maturity between 5-10 years after implementation. Based on the above, NMFS expects the temporary changes in riparian vegetation will have negligible effects on listed salmonids and their critical habitat.

Although not commonly implemented under the Program to date, constructing a new bridge crossing (likely to be 16 feet wide, but up to 20 feet wide and 100 feet long) would result in some shading of a stream. The shade provided by a new bridge may provide nominal benefits (i.e. cooler water temperatures) to salmonids within the action area. However, it could also reduce the amount of riparian vegetation growing on the creek banks and bed adjacent to bridges.

Because there will only be a few bridge widening projects, if any, implemented under the Program, NMFS expects only a small area will be affected by new shading. Therefore, only minor and localized effects on riparian vegetation will occur which are not expected to result in negative effects on the behavior or fitness of individual salmonids.

2.5.2 Dewatering Stream Reaches and Fish Collection and Relocation

Tier III projects are expected to divert surface water to isolate a construction area. Prior to construction and maintenance activities, a qualified biologist will capture and relocate fish from the area before and during stream dewatering. Fish will be captured using a combination of seining, dip netting, and or electrofishing and relocated to suitable areas outside the active construction site.

The temporary dewatering of a stream is not expected to impact juvenile salmonid movements in the action area beyond typical summer low-flow conditions. NMFS anticipates only minor and brief changes to streamflow outside of the dewatered construction area during the installation of the channel dewatering facilities. Once the cofferdam and bypass pipeline are installed and operational, streamflow above and below the work area should be the same as the pre-project conditions except within the dewatered work area where streamflow is bypassed. Juvenile steelhead surveys in Soquel Creek showed high site fidelity among fish tagged in the summer and recaptured in the fall (Sogard et al. 2009). This suggests juvenile salmonid movement in action area in the summer is also limited and that their performance and behavior will not be impaired by the separation of habitats upstream and downstream of the dewatered area for up to 10 weeks.

Stream flow diversions are expected to reduce and alter aquatic habitat conditions, including affecting macroinvertebrates (salmonid prey items). Dewatering could harm individual rearing juvenile coho salmon and steelhead by concentrating or stranding them in residual wetted areas before they are relocated (Cushman 1985). Rearing coho salmon and steelhead could be killed or injured if crushed during diversion and construction activities, though mortality is expected to be minimal due to relocation efforts prior to installation of the diversion. NMFS anticipates that only a small reach of stream habitat (maximum stream length <1,000 feet) at each project site will be dewatered for in-channel excavation activities, representing a very minor portion of habitat currently utilized by coho salmon and steelhead in Santa Cruz County. Approximately 30% of the Program's projects implemented from 2005-2009 required dewatering. During the last 10 years, 8 projects required dewatering. NMFS anticipates that the Program may follow the same trend in number of projects requiring dewatering to implement project activities.

Capture and relocation activities will occur during the summer rearing period, prior to adult salmonid spawning migration and after smolt migration. NMFS anticipates a very low number of coho salmon to be present during the proposed action due to the relative low abundance of coho salmon in Santa Cruz County. Juvenile salmonids that avoid capture may die from stranding and desiccation or from being crushed by equipment or foot traffic if not found by biologists as water levels recede within the area. However, due to fish relocation efforts, NMFS expects the number of juvenile steelhead or coho salmon that would die from stranding during dewatering activities would be low, likely no more than one percent of the steelhead within the work site prior to dewatering.

Dewatering operations may affect salmonids by temporarily preventing juvenile salmonids from accessing the area for forage; and dewatering activities may affect the function of critical habitat by reducing forage for juveniles in the dewatered area. Benthic (bottom dwelling) aquatic macroinvertebrates are an important food source for salmonids; they may be killed, or their abundance reduced when creek habitat is dewatered (Cushman 1985). However, effects to aquatic macroinvertebrates resulting from streamflow diversions and dewatering will be temporary because construction activities will be relatively short-lived. Rapid recolonization, typically within one to two months, of disturbed areas by macroinvertebrates is expected following re-watering (Cushman 1985; Thomas 1985; Harvey 1986). For this reason, we expect these functions of critical habitat will return to their pre-project level before adults and smolts use the action area for migration. In addition, the effect of macroinvertebrate loss on juvenile salmonids is likely to be negligible because food from upstream sources (via drift) would be available downstream of the dewatered areas via streamflow diverted around the project work site or from terrestrial sources. NMFS expects fish will be able to find food and cover outside of the action area as needed to maintain their fitness during project construction. Based on the small area of impact and temporary nature of the action, we anticipate these impacts to PBFs for rearing habitat will be minimal and restored quickly after the dewatering system is removed.

Fish capture and relocation activities pose a risk of injury or mortality to rearing juvenile salmonids. Any fish collecting gear, whether passive (Hubert 1996) or active (Hayes et al. 1996) has some associated risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish capture varies widely, depending on the method used, the ambient conditions, and the expertise and experience of the field crew. Since fish relocation activities will be conducted by qualified fisheries biologists, effects to and mortality of juvenile salmonids during capture will be minimized. Based on information from other relocation efforts in California, NMFS estimates the number of injured or killed salmonids from capture and relocation activities would be two percent or less of the fish captured.

To estimate the amount of juvenile fish captured, relocated, or killed, for each ESU or DPS, a formula was developed (see NMFS 2012b) to assess the total amount anticipated for the life of the Program based on density (D) of each ESU or DPS, amount (A) of stream length disturbed (includes dewatered area, downstream area, and area where captured fish are released), and number of projects (P) that would be implemented over the life of the Program that could affect each ESU or DPS. Mortality was calculated using number of projects (P) that would be implemented over the life of the Program that could affect each ESU or DPS, the density (D) of juvenile fish in each ESU or DPS, and multiplying by three percent. Using the formula of N=A*P*D (NMFS 2012) and population estimates in the *Environmental Baseline,* NMFS estimates the following numbers of juvenile salmonids will be relocated from the various project locations based on a maximum of 1,000 feet being dewatered per stream habitat improvement project[24]:

- 4,140 Juvenile S-CCC steelhead for the life of the project or 414 fish each year.
- 9,030 Juvenile CCC steelhead for the life of the project or 904 fish each year.
- 100 Juvenile CCC coho salmon for the life of the project or 10 fish each year.

Using the formula M=0.03*A*P*D (see NMFS 2012b), NMFS estimates the following number of juvenile salmonids are likely to be killed from the various project activities being dewatered per project[25]:

- 84 juvenile S-CCC steelhead for the life of the project or 8-9 fish each year.
- 184 CCC steelhead for the life of the project or 18-19 fish each year.
- CCC coho are at extremely low numbers in the project area and therefore application of the formula does not apply. Therefore, NMFS determined, based on our best professional judgement considering the most recent population estimates, no more than 2 juveniles are likely to be killed during the life of the Program.

Although sites selected for relocating fish should have ample habitat, in some instances relocated fish may endure short-term stress from crowding at the relocation sites. Relocated fish may also face increased competition for available resources such as food and habitat. Some of the fish released at the relocation sites may choose not to remain in these areas and may move either upstream or downstream to areas that have more habitat availability and a lower density of fish. NMFS does not expect any remaining impacts from increased competition would be large enough to impact the survival of individual salmonids or the Santa Cruz County populations based on the small area affected and the relatively small number of individuals likely to be relocated. Once construction activities are completed, juvenile salmonids will have the ability to return to the previously dewatered portion of the action area. Thus, NMFS does not believe capture and relocation activities will substantially reduce the fitness of individual fish that are successfully captured and relocated.

2.5.3 Increased Sediment Mobilization and Other Contaminants

Construction and maintenance activities related to the project will result in the disturbance of the creek bed and banks due to equipment/personnel access, channel excavation, construction of weirs, relocation of the water intake, and placement/removal of cofferdams. These types of activities have been shown to result in temporary increases in turbidity (reviewed in Furniss et al.

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[24] 1,000 feet is the maximum distance a stream may be dewatered for a stream habitat improvement project. We do not expect every project in the next 10 years will be a stream habitat improvement project. Therefore, the number of juvenile steelhead captured and killed per year and during the life of the project is expected to be significantly lower.
[25] Ibid.

1991; Reeves et al. 1991; Spence et al. 1996). Following construction, disturbed substrate could affect water quality and critical habitat in the action area in the form of small, short-term increases in turbidity during cofferdam removal and subsequent rainfall events.

Sediment may affect salmonids in several ways. High concentrations of suspended sediment can disrupt normal feeding behavior and efficiency (Cordone and Kelly 1961; Bjornn et al. 1977; Berg and Northcote 1985), reduce growth rates (Crouse et al. 1981), and increase plasma cortisol levels (Servizi and Martens 1992). High and prolonged turbidity concentrations can lower dissolved oxygen in the water column, reduce respiratory function, lower disease tolerance, and even cause fish mortality (Sigler et al. 1984; Berg and Northcote 1985; Gregory and Northcote 1993; Velagic 1995; Waters 1995). Even small pulses of turbid water may cause salmonids to disperse from established territories (Waters 1995), which can displace fish into less suitable habitat and/or increase competition and predation, decreasing survival. In addition, increased sediment deposition can fill pools and reduce the amount of cover available to fish, decreasing the survival of juvenile salmonids (Alexander and Hansen 1986).

Chronic elevated sediment and turbidity levels may adversely affect salmonids and their critical habitat; however, the temporary increases in sedimentation and turbidity levels associated with the Program are not expected to rise to a level that would alter behavior, injure, or kill salmonids present in the action area. This includes instances when large wood may be installed within the active stream channel without dewatering where NMFS staff must review and approve the plan and an approved biologist will be on-site during all activities to monitor for directly mortalities and/or adverse impacts to water. Construction or maintenance activities associated with the practices covered under this Program may result in temporary increases in turbidity levels in the stream. In general, these activities would not result in significant increases in turbidity levels beyond the naturally occurring, background conditions. The RCD has proposed several measures to stabilize and prevent the mobilization of sediment post-construction. These measures include applicable stormwater BMPs such as erosion control fabric, silt fences, check dams, and revegetating disturbed areas with a native seed mix post-construction. Based on these measures, NMFS expects any sediment or turbidity generated by construction activities would be minor and localized (not extend more than 300 feet downstream of the work site), well below levels known to cause injury or harm to salmonids. NMFS does not anticipate harm, injury, or behavioral impacts to CCC steelhead, S-CCC steelhead or CCC coho salmon associated with exposure to elevated suspended sediment from project activities. Regarding critical habitat, the temporary exposure of habitats to increased sedimentation or turbidity is not expected to reach the scale where the PBFs of critical habitat will be altered.

Construction and maintenance operations in, over, and near surface water have the potential to release debris, hydrocarbons, concrete/cement, and similar contaminants into surface waters. Potential contaminants that could result from projects like these include wet and dry concrete debris, fuel and lubricant for construction equipment, and various construction materials. If introduced into aquatic habitats, debris could impair water quality by altering the pH, reducing oxygen concentrations as the debris decompose, or by introducing toxic materials such as hydrocarbons or metals into the aquatic habitat. Oils and similar substances from construction equipment can contain a wide variety of polynuclear aromatic hydrocarbons (PAHs) and metals. PAHs can alter salmonid egg hatching rates and reduce egg survival as well as harm the benthic organisms that are a salmonid food source (Eisler 2000).

Heavy equipment and storage of materials may be used during the Program. As a result, if not properly contained, contaminants (e.g., fuels, lubricants, hydraulic fluids, concrete) could be introduced into the water system, either directly or through surface runoff. The effects described above for contaminants have the potential to temporarily degrade habitat and harm exposed fish. Equipment refueling, fluid leakage, and maintenance activities within and near the stream channel pose some risk of contamination and potential adverse effects. In addition to toxic chemicals associated with construction equipment, water that comes into contact with automotive fluids from cars used as riprap could adversely affect water quality and cause harm to listed salmonids. Petroleum based chemicals, such as oil and gas could be released from removal of cars used as riprap. These chemicals have likely leached into the soil substrate for the past several decades and affected water quality conditions. NMFS anticipates that few chemicals remain in association with cars used as riprap. The small amounts that may remain will likely have negligible impacts on listed salmonids and their critical habitat if released during the removal of car bodies from stream beds or banks because the multiple measures in the sections entitled, *Measures to Minimize Disturbance from Instream Construction* and *Measures to Minimize Degradation of Water Quality* within Part IX of the CDFG Manual address and minimize this risk.

Program activities include stream crossings, access road improvement, and other road-related activities. These activities may expose salmonids to the degradation product of tires (6PPD-quinone) which has been identified as the causal factor in coho salmon mortality at concentrations of less than a part per billion (Tian et al. 2022, Tian et al. 2020) and to steelhead trout at concentrations of one part per billion (Brinkmann et al. 2022; J. McIntyre and N. Scholz, unpublished results 2020). Coho adults are noted to perish "within hours" of exposure (Sholz et al. 2011) and juvenile coho perished or were completely immobile within seven hours of exposure (Chow et al. 2019). Coho juveniles did not recover even when transferred to clean water (Chow et al. 2019). Steelhead mortality can begin as soon as seven hours post exposure (Brinkmann et al. 2022). Effects appear to be related to cardiorespiratory disruption, consistent with symptoms (surface swimming and gaping followed by loss of equilibrium [Sholz et al. 2011]) and therefore sublethal effects such as disruption of behaviors needed for survival (e.g. predator avoidance) and swimming performance are expected. Additional research concerning sublethal effects is needed. Mortality can be prevented by infiltrating the road runoff through soil media containing organic matter which results in removal of this (and other) contaminant(s) (Fardel et al. 2020; Spromberg et al. 2016; McIntrye et al. 2015. The exposure will be minimized through road outsloping, rolling dips, reseeding and mulching disturbed areas, and other erosion control measures that increase infiltration and filtration of runoff as detailed in Weaver and Hagans (1994). These erosion control measures should prevent nearly all runoff containing 6PPD-quinone from reaching fish bearing streams, especially the most contaminated first flush of runoff that follows prolonged dry conditions. Most roads are dirt or gravel. All are low use, and therefore, limited contamination is expected. Therefore, we expect mortality associated with road-related activities, when implemented with the proposed preventative erosion control measures, will be avoided.

Additionally, the Program includes avoidance and minimization measures to address spills, avoid uncured concrete from coming into contact with live water, and preventing the introduction of construction debris and contaminants into the action area. Due to these measures, conveyance of toxic materials into waterways within the action area during Program implementation is not expected to occur.

The proposed action includes use of herbicides in the ten-year RGP program, which may result in exposure of steelhead and coho salmon. Exposures are only expected to occur periodically and last for short periods of time (hours to days). NMFS has previously analyzed the effects of herbicide use in invasive and exotic vegetation control and restoration projects on large scale, multi-year actions proposed by the U.S. Forest Service, Bureau of Land Management, Bonneville Power Administration (BPA), and Klamath Renewal Corporation (NMFS 2010; NMFS 2012c; NMFS 2020a, NMFS 2021). The types of plant control actions analyzed here are a less aggressive subset of the types of actions considered in those analyses as the previous RGP cycle only averaged approximately 2.5 projects per year in the Restoration and Management of Declining Habitats category and these projects averaged about 1 acre in size with a maximum size of 5 acres. The proposal in this RGP cycle is for up to 5 projects per year with the same size range expected. The potential effects presented here are summarized from the previous analyses and are updated using the best available information.

The BMPs described in the **Proposed Action** section are designed to limit the potential for exposure from these applications. If they work as intended, no fish should be exposed to an herbicide. Realistically, the BMPs may not be enough to prevent movement of herbicides via drift, erosion of treated sediments, or transport through shallow groundwater connections to the streams without more knowledge of the individual projects and sites that will be treated with herbicides. NMFS has determined that the use of herbicides and associated adjuvants in this proposed RGP over the course of ten years may affect fish though a combination of chemical and biological endpoints including chemical toxicity, impacts to forage species and emergent vegetation that provides habitat benefits.

Juvenile salmonids, particularly recently emerged fry, are known to use the low velocity areas along stream and river margins until they grow sufficiently to occupy habitats with higher flow velocities. Larger salmonids may also use stream and river margins as velocity refuges, but also for thermal refuge or predator avoidance in addition to foraging opportunities. NMFS has identified three scenarios where the application of herbicides and associated adjuvants may expose salmonids in this habitat and potentially lead to effects: runoff from riparian area applications, accidental application via drift, and runoff from intermittent or ephemeral stream channels and ditches purposefully treated. These exposures may occur as the surface waters are exposed or as a result of movement through shallow groundwater contributions to flowing waterbodies. The Program BMPs are expected to prevent large scale discharges of herbicides to the streams in the treatment areas and as a result any herbicide exposure is expected to be localized and rapidly diluted. Therefore, only salmonids in close proximity to the projects are likely to be exposed.

As detailed previously, the RGP has proposed numerous BMPs as part of the proposed action that are intended to prevent exposure. Although these BMPs will minimize the risk of exposure under typical circumstances, they do not eliminate the risk for the proposed action and we assume herbicides and associated adjuvants reaching surface waters are likely to result in adverse effects. The NMFS Northwest Fisheries Science Center examined several herbicide formulations used in forestry, including three proposed for use in this project (glyphosate, imazapyr, and triclopyr TEA), and found that they were unlikely to pose a threat of mortality to salmonid embryos (Stehr et al. 2009). However, this same study also noted that their findings do not extend to other life stages or physiological processes (e.g., smoltification, respiration, disease resistance, behavioral changes that can result in predation, etc.) or account for effects to aquatic food webs that may reduce feeding success. The caution expressed in Stehr et al. (2009) is warranted due to the findings of other studies. Tierney et al. (2006) found that olfaction performance was compromised by sublethal glyphosate exposure and this can result in disruption of essential behaviors such as migration, feeding, predator avoidance and detection of spawning cues (Meehan 1991; Hecht et al. 2007). Weis et al. (2001) noted that behavioral changes are driven by molecular level physiological stresses such as changes in enzymatic function, ligand-receptor interaction, or oxygen metabolism that is often caused by exposure to contaminants including various pesticide products.

For the most recent consultation on the BPA's Habitat Improvement Program (NMFS 2020), the BPA examined the aquatic toxicity of all the herbicides proposed for use in the RGP for the Santa Cruz RCD's Program. This effort defined adverse effect thresholds as either the lowest or chronic "no observable effect concentration" (LOEC or NOEC) or as $1/20^{th}$ of the LC50 (the lethal concentration to 50% of a test group) for listed salmonids, whichever was lower. BPA calculated a risk quotient (RQ) by dividing this no adverse effect level by an expected environmental concentration (EEC) or a generic estimated environmental concentration (GEEC). Both EECs and GEECs are developed using EPA modeling software and are generally considered as a worst-case potential for herbicide pollution of a nearby waterbody from typical use patterns. If the resulting RQ is greater than 10, then the risk to an individual fish is considered low. If the result is less than 1, then the risk to an individual fish is considered high. Results between 1 and 10 are considered to carry a moderate amount of risk to an individual fish. The RQs for all the herbicides proposed for use in this proposed action are greater than 10, except for dicamba which is 3.3. The herbicide information assembled by BPA and examined by NMFS (2020) is reliable for use in this proposed action due to its timeliness, the similar use patterns and application methods of the herbicides, and the similar ecotones present in the Columbia River basin and Santa Cruz County.

Information for the proposed herbicides is briefly summarized below:

Aminopyralid. This is a relatively new selective herbicide and is used to control broadleaf weeds. Aminopyralid shows moderate mobility through the soil, but it does not bioconcentrate in the food web. The primary means of exposure for fish and aquatic invertebrates is through direct contact with contaminated surface waters. Acute toxicity tests show aminopyralid to be practically non-toxic, with some aquatic invertebrates showing more sensitivity. The calculated RQ is 417.

Chlorsulfuron. This herbicide controls broadleaf weeds and some annual grasses. Chlorsulfuron is likely to be persistent and highly mobile in the environment. It may be transported to nontarget areas by runoff and/or spray drift. Degradation by hydrolysis is only significant in acidic environments (23-day half-life at pH = 5); it is stable to hydrolysis at neutral to high pH. Degradation half-lives in soil environments range from 14 to 320 days. This herbicide does not bioaccumulate in fish and is practically nontoxic to both freshwater and estuarine/marine fish on an acute exposure basis. The calculated RQ is 240.

Dicamba. Dicamba is used to control broadleaf weeds, brush and vines. It is categorized by EPA as slightly toxic to fish and practically non-toxic to aquatic organisms. It is a moderately persistent herbicide, highly mobile in soils, and is a likely groundwater contaminant. Dicamba has been the subject of recent lawsuits because of crop damage caused by drift of dicamba, with recent science showing the dicamba is subject to drift even in stable air applications (Bish et al. 2019). Calculated RQ is 3.3, with an associated moderate level of concern. Due to its potential mobility and drift post application, there is a risk of exposure to coho salmon and steelhead, particularly juveniles in shallow habitats adjacent to treatment areas.

Glyphosate (aquatic). Glyphosate is a nonselective herbicide used to control grasses and herbaceous plants. It is moderately persistent in soil, with an estimated average half-life of 47 days but it is not considered mobile. Glyphosate is relatively non-toxic for fish. There is a low potential for the compound to build up in the tissues of aquatic invertebrates. The calculated RQ for aquatic glyphosate is 214.

Imazapyr. Imazapyr is used to control a variety of grasses, broadleaf weeds, vines and brush species. A typical half-life for imazapyr in soils is 10 days. Microbes and sunlight break down imazapyr in the environment. Imazapyr's potential to leach to groundwater is high, surface runoff potential is high, and potential for loss on eroded soil is intermediate. Imazapyr has low volatility and the potential for loss to the atmosphere is low. Bioaccumulation of imazapyr in aquatic organisms is low. Toxicity to fish is considered practically non-toxic. The calculated RQ for imazapyr is 110.

Triclopyr (TEA). Triclopyr is a systemic herbicide with selective control of woody and broadleaf species. Triclopyr triethylamine salt (TEA) is highly soluble in water and dissociates within one minute to the weak acid, triclopyr. Aquatic photolysis and microbial breakdown are significant degradation pathways for triclopyr. Dissipation half-lives of triclopyr in water range from 0.5 days to 7.5 days. In sediment, triclopyr dissipation rates ranged from 2.8 to 5.8 days in field studies. Triclopyr is, however, persistent under anaerobic aquatic conditions. It is highly water soluble and is not expected to bind with organic materials. Triclopyr TEA is practically non-toxic to freshwater fish and aquatic invertebrates. The calculated RQ is 75.5.

Pesticides, including herbicides, are often applied in conjunction with an adjuvant. Adjuvant is a broad term describing any additive to a pesticide spray that enhances pesticide activity and often refers to surfactants and penetrants, but also includes colorants (dyes) that help identify sprayed surfaces and potential off target applications. Surfactants facilitate and accentuate the emulsifying, dispersing, spreading, wetting, or other surface modifying properties of liquids. They are commonly referred to as “spreaders and stickers”. Penetrants help the pesticide penetrate a membrane (e.g., plant cuticles or gill tissue). Many adjuvants can be more toxic than the active ingredient of an herbicide itself and/or increase the toxicity of the active ingredient by making it more biologically available. This project proposes to only use adjuvants determined to be practically non-toxic and registered for use on aquatic sites by the State of Washington (WSDA 2017). This set of 21 potential choices is the same as previously reviewed by NMFS (2021).

Based on the information presented above, NMFS has determined that it is likely that individual listed salmonids, particularly juveniles, exposed to the proposed chemicals will experience sublethal adverse effects. As numerous BMPs will be used in the projects, it is expected that any herbicide treatment that results in exposure will be relatively minor and will be diluted within a few hundred feet of the point(s) of entry. Exposures are only expected to occur periodically and last for short periods of time (hours to days). Still, these exposures could result in sublethal effects to individual salmonid fitness through injury or modification of essential behaviors, or habitat utilization. Exposure could affect the prey resources in the near shore areas being utilized or could affect the establishment of plant species growing or planted in the riparian zone which contribute terrestrial insects to the streams. In-stream prey resources affected (benthic macroinvertebrates) are expected to rapidly recolonize exposed areas.

2.5.4 Changes to Channel Morphology

For riprap, the primary habitat functions of concern are related to floodplain connectivity, forage, natural cover (undercut banks, large wood etc.), changes in local stream hydrology, and free passage. The installation of rock or wood in the stream, (i.e., for the purposes of stabilizing the toe of a bank) would increase the “hardness” of a bank. Bank stabilization impacts the physical habitat in two general ways: by changing a dynamic, unrestrained stream that constantly evolves due to 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 aquatic species, including juvenile salmonids. Lining the entire streambank with rock rip rap results in a habitat interface lacking suitable juvenile fish habitat (Schmetterling et al. 2001)

Bank stabilization can also preclude the natural fluvial and geomorphic processes. In most low gradient streams, the channel will naturally “meander”, eroding laterally to dissipate its hydraulic energy while creating a sinuous longitudinal course. Stream meandering efficiently regulates the erosive forces by lengthening the channel and reducing stream gradient, thus controlling the ability of the stream to entrain and transport available sediment. Meandering streams also create and maintain both the hydraulic and physical components of instream habitat used by fish and other aquatic species. For instance, specific to salmon and steelhead, a meandering, unconstrained stream channel sorts and deposits gravel and other substrate necessary for optimal food production and spawning success, maintains a healthy and diverse riparian corridor that supplies LWD to the channel, and inundates adjacent floodplain habitat during appropriate winter/spring flows (Spence et al. 1996).

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

Increased hardness of the bank increases bank velocities, reduces sediment retention and gravel assortment, and can reduce riparian composition and recruitment. Increasing bank velocities that can affect over-wintering habitat for juveniles and passage opportunities for upstream migrating adults by reducing slow-water refugia during high-flow periods. Hardened stream banks can also permanently remove natural cover such as undercut banks and large wood. Modifying sediment retention and gravel assortment can affect suitable substrate needed for spawning adults and cover and feeding opportunities for juveniles. Reduction in riparian composition and recruitment can affect stream temperature, water quality, streambank stability, and forage.

There are several protection measures included in the Program to minimize the effects of bank hardening. Construction and maintenance of any practice that results in a change in volume of flow in streams that support salmonids are not covered under the Program. Additionally, "bioengineered" solutions using vegetation and soft materials (as opposed to concrete and riprap, for example) are the preferred options where conditions are favorable for their use. The stabilization of waterbodies to avoid loss of an unpaved road (or foot trail) with hardscape when there is room to move the road (or trail) is prohibited. Applications of riprap require backfilling with soil and planting with in-kind native vegetation. When riprap is installed, large wood or other habitat features will be added. Based on the number of projects implemented in the past (14 projects with streambank protection since 2005), and the goal of the Program, we expect the total amount of streambank that will be hardened without bioengineering will be low.

Increased bank hardness and a change in channel morphology could result in slower fish growth due to less food supplied in the hardened stream as compared to a natural stream bank. If these smaller fish are unable to move to areas with better resources for growth, they likely experience lower survival upon ocean entry (Holtby et al. 1990), especially if unfavorable ocean conditions exist. As a result, these smaller fish are less likely to return and spawn. However, with the preferred approach of bioengineering (and where riprap must be used—backfilling with soil and planting native vegetation, and adding large wood and other habitat features), the effects of bank hardening will be minimized. At the sites where bank hardening occurs (bank stabilization sites), fish response will be long in duration. Bank hardening, and its resulting effect on natural channel-evolution processes and instream habitat, are expected to last well into the future—at least several decades. These effects will be somewhat offset by the addition of riparian plantings, large wood, boulders, etc. However, the long-term impacts from bank stabilization are likely to lead to decreased productivity and abundance of juvenile salmon at some bank stabilization sites over successive generations. This is because in some areas where projects may occur, there may not be more suitable (and unoccupied) habitat available nearby. In effect, the proposed bank stabilization will create diminished carrying capacity at these sites.

NMFS cannot precisely estimate the number of juvenile fish that may be injured or killed due to loss of habitat but expects the number lost to be very small, and that losses will not occur at every bank hardened site each year. This is because: 1) the areas likely affected by bank hardening are very small compared to the total Program area available to rearing fish; and 2) habitat conditions and carrying capacities vary over time due to natural fluctuations in temperatures, stream flows, sediment inputs, etc. For example, in some years rearing fish are likely to find suitable habitat available near these sites for rearing and the effects of bank hardening at these sites will be negligible. Because the extent and number of projects is small, and projects that affect the volume of flow where salmonids are present are not allowed under the program, we do not anticipate impacts to migrating salmonids (adults or smolts).

2.5.5 Beneficial Effects of the Program

Under the Program, projects would be implemented that are designed to be beneficial to salmonid habitat. The removal or modification of known barriers to allow for salmonid migration would allow steelhead and coho salmon to reach potentially higher quality spawning and rearing habitats upstream of the barriers which they were previously unable to reach. In addition, erosion control would reduce the amount of fine sediment entering streams that would otherwise clog and bury spawning gravels and redds. The practices of the Program are aimed at improving fish habitat. The quality of habitat would also be improved through the installation of structures such as large wood and boulders that create refuge habitat for juvenile and overwintering steelhead and coho salmon.

Instream habitat structures and improvement projects will 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 will be designed to reduce sedimentation, stabilize existing slides where existing effects are detrimental, provide shade, and create scour pools. Riparian restoration projects will improve shade and cover, protecting rearing juveniles, reducing stream temperatures, and improving water quality through pollutant filtering. Beneficial effects of constructing livestock exclusionary fencing in or near streams include the rapid regrowth of grasses, shrubs, and other vegetation released from overgrazing and the reduction of excessive nitrogen, phosphorous, and sediment loads in the streams (Line et al. 2000; Brenner and Brenner 1998).

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.

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).

NMFS does not anticipate any cumulative effects in the action area other than those ongoing actions already described in the Environmental Baseline above. Given current baseline conditions and trends, NMFS does not expect to see significant changes in cumulative effects in the near future due to existing development and use of water in the watershed. NMFS assumes the rate of such development and water use would be similar to that observed in the last decade.

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 10-year Program is located in Santa Cruz County within watersheds that support endangered CCC coho salmon, threatened CCC steelhead, and threatened S-CCC steelhead and their respective critical habitat. These populations have declined from their historic abundances due to the widespread degradation and loss of historic habitats caused by factors including hydrologic modifications (reservoir storage, surface diversions, and groundwater pumping), land use change (urbanization, timber harvest, agriculture, and mining), construction of dams and other migration impediments, channelization and disconnection from floodplains, and the introduction of non-native and invasive species. Coho salmon populations within the diversity stratum have declined substantially over the past several decades and now are only occasionally found in the San Lorenzo River basin—usually the result of straying from hatchery releases.

The Program includes the implementation of conservation practices that will require temporary dewatering of salmonid bearing streams, fish capture and relocation, and other disturbances during Program activities. Program activities not in upland areas will occur during the dry season (June 15-October 15). We expect juvenile steelhead will be present throughout the action area, though the presence of juvenile coho salmon will be rare as the consistent presence of juvenile coho salmon in project areas is unlikely. Even with the potential impacts, implementation of the

Program over the next 10 years is expected to largely improve habitat conditions in the action area by providing complex physical habitat components. These include suitable spawning substrates, structural elements such as boulders and/or large wood where appropriate, resting pools, overhead cover, and diverse riparian plant communities. In a few areas, the value of PBFs for salmonid conservation will be limited by streambank bank hardening.

2.7.1 Summary of Effects to CCC steelhead, S-CCC steelhead and CCC coho salmon

CCC coho salmon are endangered. Historically, there were 11 functionally independent populations and 1 potentially independent population of CCC coho salmon (Spence et al. 2008, Spence et al. 2012). Most of the populations in the CCC coho salmon ESU are currently doing poorly as a result of low abundance, range constriction, fragmentation, and loss of genetic diversity, as described below. 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 overall numbers and geographic distributions have been extirpated (NMFS 2016a).

CCC steelhead are threatened. Historically, approximately 70 populations of steelhead existed in the CCC steelhead DPS (Spence et al. 2008; Spence et al. 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). Populations that historically provided enough steelhead immigrants to support dependent populations may no longer be able to do so, placing dependent populations at increased risk of extirpation. However, because CCC steelhead remain present in most streams throughout the DPS, roughly approximating the known historical range, CCC steelhead likely possess a resilience that has slowed their rate of decline relative to other salmonid species.

S-CCC steelhead are threatened. Although steelhead are present in most streams in the S-CCC DPS (Good et al. 2005), their populations are small, fragmented, and unstable (more subject to stochastic events) (Boughton et al. 2006). 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). NMFS's recovery plan (NMFS 2013) for the S-CCC steelhead DPS determined recovery of this DPS will require recovery of a minimum number of viable populations within each of four Biogeographic Population Groups: Interior Coast Range, Carmel River Basin, Big Sur Coast, and San Luis Obispo Terrace – within the S-CCC Steelhead Recovery Planning Area.

In this opinion NMFS identified the following components of the proposed action that would result in adverse effects to CCC steelhead, S-CCC steelhead, and CCC coho salmon: log jam removal, fish collection and relocation, dewatering, temporary loss of riparian vegetation, temporary increases in suspended sediment and other contaminants, bank stabilization, and temporary modifications to fish passage and streamflow from stream diversions (for construction). Of these, fish collection and relocation, dewatering, bank stabilization, log jam removal, and herbicide use are likely to result in injury or mortality, of juvenile CCC steelhead, S-CCC steelhead, and CCC coho salmon.

Anticipated injury or mortality from capture and relocation is expected to be less than three percent of the fish present, and injury or mortality expected from dewatering is expected to be one percent of the fish present prior to relocation and dewatering (combined injury or mortality not to exceed three percent). A total of 184 juvenile CCC steelhead and 84 S-CCC steelhead may be killed during fish relocation and dewatering activities over the 10-year Program term. This is due to the expected abundance of steelhead (a total of 9,030 CCC steelhead and 4,140 S-CCC steelhead captured), the relocation efforts prior to construction, and the low injury and mortality rates expected from fish relocation methods. Overall, the number of juvenile steelhead potentially affected by the Program will be a small fraction of the total number of juveniles in Santa Cruz County. CCC coho salmon are at extremely low numbers in the Program area and NMFS expects no more than two juvenile coho salmon may killed by fish capture, relocation, and dewatering during the life of the Program.

Due to the uncertainty associated with the effectiveness of the BMPs over the ten-year period and considering the mobility of some of the proposed chemicals, the use of herbicides and associated adjuvants may result in exposure of salmonids in the near shore habitats. Exposures are only expected to occur periodically and last for short periods of time (hours to days). As numerous BMPs will be used in the projects, it is expected that any herbicide treatment that results in exposure will be relatively minor and will be diluted within a few hundred feet of the point(s) of entry. Still, these exposures could result in sublethal effects to individual salmonid fitness through injury or modification of essential behaviors, or habitat utilization. Exposure could also affect the prey resources in the near shore areas being utilized or could affect the establishment of plant species growing or planted in the riparian zone which contribute terrestrial insects to the streams. It is likely that only low numbers of individual salmonids will be exposed and affected as described above. Prey resources affected (benthic macroinvertebrates) are expected to rapidly recolonize exposed areas and not be impacted long enough to affect salmonid growth. In the long term, implementation of the program is expected to increase the viability of salmonid populations because of the improved habitat conditions along the waterways of Santa Cruz County.

The long-term impacts from bank stabilization are likely to lead to decreased productivity and abundance of juvenile salmon at some bank stabilization sites over successive generations. NMFS cannot precisely estimate the number of juvenile fish that may be injured or killed due to loss of habitat but expects the number lost to be very small, and that losses will not occur at every bank hardened site each year.

In addition to the adverse effects described above, we also considered the effects of increased sedimentation and turbidity and other hazardous contaminants, loss of instream cover and riparian shade, dewatering stream reaches, log jam removal, and changes to channel morphology. The implementation of proposed minimization measures is expected to render the potential for exposure to water quality impairment as improbable. Revegetation is expected to rehabilitate areas where cover is lost, and a slight increase in the amount of hardscape in a channel is not expected to result in reductions in fitness of individual salmonids within the action area. However, log jam removal and changes to channel morphology will likely reduce carrying capacity at some sites where these practices are used. This is likely to result in the loss of small numbers of rearing fish in some years. Because the extent and number of projects is small, and Program projects will avoid altering the volume of flow where salmonids are present, we do not anticipate impacts to migrating salmonids (adults or smolts).

Due to the relatively large number of juveniles produced by each spawning pair, steelhead and coho salmon spawning in Santa Cruz County watersheds in future years are likely to produce enough juveniles to replace the few (e.g., two juvenile coho salmon in the next 10 years) that are likely to be lost in the project areas due to the effects of the proposed action (fish collection, relocation, and temporary dewatering for construction or maintenance, and small losses in carrying capacity at log jam removal and bank hardening sites). NMFS expects the beneficial effects of the proposed project will help to increase the survival chances of many individual fish in the program area overall. Thus, the consequences of the proposed action are unlikely to reduce the species' probability of recovering given the goals, strategies, and recommended actions laid out in the recovery plans. Therefore, we do not expect the proposed project to affect the persistence or recovery of CCC steelhead, S-CCC steelhead or CCC coho salmon populations in Santa Cruz County.

2.7.2 Summary of Effects on Critical Habitats

The Program area contains critical habitat for the CCC and S-CCC steelhead DPSs and CCC coho salmon ESU. In our adverse modification analysis, we consider the condition of critical habitat, the potential effects of the Program on critical habitat, and whether or not those effects are expected to diminish the value of critical habitat for the conservation of CCC steelhead, S-CCC steelhead, or CCC coho salmon.

Critical habitat for the CCC and S-CCC steelhead DPSs and CCC coho salmon ESU is impaired. While conditions vary, critical habitat has been impaired by habitat loss, alteration and fragmentation, surface and groundwater extraction, land use conversion, and estuarine habitat loss. These factors also affect CCC steelhead, S-CCC steelhead, and CCC coho salmon critical habitat in the Program area, which has been impaired by rural developments, water diversions, and historic forestry and other land use practices. Both watershed-wide factors and action area-specific factors affect critical habitat in the action area leading to reduced habitat complexity and accessibility, poor substrate quality for spawning, and limited juvenile rearing habitat.

Implementation of the Program over the next 10 years is expected to improve CCC coho, CCC steelhead, and S-CCC steelhead critical habitat overall in the action area by providing complex physical habitat components and improving fish passage. The Program will result in long-term improvements to critical habitat, yet some temporary and permanent impacts to critical habitat will occur. During construction, some minor and temporary increases in sedimentation, interruption in streamflow, and reductions in vegetation will occur and impact PBFs for salmonid critical habitat, including rearing sites with water quality and forage supporting juvenile development. Herbicide use will likely result in minor and temporary reductions in prey resources. Removing log jams is likely to result in reduced habitat value in small areas at removal sites over the long term. Streambank protection will result in permanent channel modification, yet the scale of impact will be small because bioengineered approaches will be prioritized. Where riprap is installed, large wood and other habitat features will be installed. This is expected to minimize impacts to PBFs of salmonid habitat. Long-term improvements to critical habitat from the Program will reduce the amount of fine sediment entering streams, provide predator escape and resting cover, increase spawning habitat, and improve fish migration opportunities. These beneficial effects are likely to outweigh the smaller (i.e. the extent of stream reaches in watersheds affected) long-term reductions in the value of PBFs in areas where banks are hardened or log jams removed.

2.7.3 Climate Change

Future climate change could affect CCC steelhead, S-CCC steelhead, and CCC coho salmon and their designated critical habitats within the action area. Some probable consequences of climate change in the Monterey Bay region are increases in both air and water temperatures, and changes in the timing and magnitude of storms, their runoff, and dry season streamflow. These projections further highlight the importance of providing suitable streamflow conditions for fish passage, spawning and rearing in the streams of the CCC steelhead and S-CCC steelhead DPSs and CCC coho salmon ESU.

Over time, climate change may alter the vegetation communities of the central California coast, including the coast redwood forest prevalent in Santa Cruz County. Through the end of this century, we expect forested watersheds in the county will remain forested, which will continue to buffer against potential changes in water temperature. Furthermore, the fish habitat improvements that would occur under the program will likely enhance access to, or improve thermal refugia in some watersheds.

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 cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of the CCC steelhead DPS, S-CCC steelhead DPS, or CCC coho salmon, nor 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.

2.9.1 Amount or Extent of Take

In the biological opinion, NMFS determined that take is reasonably certain to occur as follows. Table 8 summarizes the maximum anticipated take for each ESU/DPS for the 10-year Program and annual take. Table 9 summarizes the maximum juvenile steelhead and coho mortality associated with capture and relocation activities.

Table 8. Estimated capture of salmonid juveniles for each ESU or DPS in Santa Cruz County.

	Fish captured (N) for 10-year Program	Fish captured per year (N/10)
CCC coho salmon	100	10
CCC steelhead	9,030	904
S-CCC steelhead	4,140	414

Table 9. Maximum mortality associated with capture of juvenile steelhead and coho (see NMFS 2012 for methodology).

DPS	Mortality for 10-year Program	Mortality per year
CCC steelhead	184	18-19
S-CCC steelhead	84	8-9
CCC coho salmon	2	n/a

NMFS anticipates this level of anticipated take outlined in the two tables above will occur over the Program's 10-year period. Anticipated take will be exceeded if the annual or Program amounts are exceeded.

Quantifying the number of individuals lost from the harm caused by the proposed bank hardening and log jam removal is inherently difficult. Complex and variable components such as environmental variation 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 this circumstance, NMFS cannot provide a precise amount of take that would be caused by the proposed action. In this type of circumstance, NMFS uses one or more surrogates to estimate the extent of incidental take.

Therefore, for harm associated with bank hardening, the linear length of streambank covered by rip-rap rock armor will serve as an effective take surrogate. Specifically, the anticipated take will be exceeded if the total rip-rap rock armor placement exceeds 200 ft contiguous rock protection and 500 ft of non-contiguous protection over 2,000 ft of bank, or the spatial area exceeds 0.06 acres. Likewise, anticipated take will be exceeded if the amount, size and type of habitat enhancement elements (e.g. large wood, vegetative plantings, etc.) as proposed within the final project designs, are not incorporated into the constructed Project. This surrogate operates as an effective reinitiation trigger because the Corps has authority to conduct compliance inspections and to take actions to address noncompliance, including post-construction (33 CFR 326.4).

For harm associated with log jam removal, the number and length of log jams removed each year by the Program will serve as an effective surrogate. Specifically, the anticipated take will be exceeded if more than two log jams per year are removed or modified or if the maximum dimensions for a log jam modification/removal site exceed 30 ft by 50 ft (across channel). This surrogate operates as an effective reinitiation trigger because the Corps has authority to conduct compliance inspections and to take actions to address noncompliance, including post-construction (33 CFR 326.4

Herbicide applications, as constrained by the BMPs, are reasonably certain to result in herbicide drift or movement into streams that will harm listed salmonids. Incidental take caused by the effects of this action cannot be accurately quantified as a number of fish because the distribution and abundance of fish that occur within the action area are affected by habitat quality, competition, predation and the interaction of processes that influence genetic, population and environmental characteristics both within and outside the project area. NMFS cannot precisely predict the number of fish that are reasonably certain to be injured if fish are exposed to herbicides and their associated adjuvants. Additionally, there is no practical way to count the number of fish exposed to herbicides without causing additional stress and injury to these fish. In such circumstances, NMFS can use the causal link established between the activity and the likely changes in habitat conditions affecting the listed species as a surrogate to describe the extent of take in terms of habitat disturbance.

Application of herbicides and associated adjuvants will result in short-term degradation of water quality, which is reasonably certain to cause injury to fish in the form of sublethal adverse physiological effects. This is particularly true for herbicide applications in riparian areas that may deliver herbicides via drift to streams occupied by listed salmonids. These sublethal effects were described in the effect’s analysis for this opinion. The best available indicator for the extent of take due to proposed RGP is the annual number of treated acres for the planned life of the RGP. Thus, if more than 50 acres of treatment each year through the proposed ten-year period is exceeded, incidental take of listed salmonids due to herbicide application will be considered exceeded. Although this surrogate is the number of treated acres per year for the planned life of the RGP, it will serve as an effective reinitiation trigger because it can be accurately measured within each year of the RGP.

2.9.2 Effect of the Take

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

2.9.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are 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 juvenile CCC and S-CCC steelhead and juvenile CCC coho salmon:

1. Undertake measures to ensure that injury and mortality to salmonids resulting from fish capture and relocation and dewatering activities is low;
2. Undertake measures to minimize harm to salmonids from the project through degradation of aquatic habitat; and
3. Prepare and submit plans and reports regarding fish capture and relocation, dewatering, construction and maintenance activities, and habitat and streamflow monitoring.

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, RCD or any contractor 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.

The following terms and conditions implement reasonable and prudent measure 1:

- Corps, RCD, or the contractor will allow any NMFS employee(s), or any other person designated by NMFS, to accompany field personnel to visit a project sites during activities described in this opinion. Corps, RCD, or the contractor will retain qualitied biologists with expertise in the area of anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid/habitat relationships; and biological monitoring of salmonids. All fisheries biologists working on this project will be qualified to conduct fish collections in a manner that minimizes all potential risks to ESA-listed salmonids. Electrofishing, if used, shall be performed by a qualified biologist and conducted according to the NOAA's electrofishing guidelines (NMFS 2000). See: https://media.fisheries.noaa.gov/dam-migration/electro2000.pdf.
- Corps, RCD, or the contractor will ensure that a biologist monitors the construction sites during placement and removal of cofferdams and channel diversions to ensure that any adverse effects to salmonids are minimized. A biologist will be on site during all

dewatering events to capture, handle, and safely relocate salmonids to an appropriate location. The biologist will notify NMFS staff at William.Stevens@noaa.gov, or at 707-575-6066, one week prior to capture activities in order to provide an opportunity for NMFS staff to observe the activities.

- Salmonids will be handled with extreme care and kept in water to the maximum extent possible during rescue activities. All captured fish will be kept in cool, shaded, aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream, and fish will not be removed from this water except when released. To avoid predation, the biologist will have at least two containers and segregate young-of-year from larger age classes and other potential aquatic predators. Captured salmonids will be relocated, as soon as possible, to a suitable instream location (pre-approved by NMFS – see below) in which suitable habitat conditions are present to allow for adequate survival of transported fish and fish already present.
- If any steelhead or coho are found dead or injured, the biological monitor will contact NMFS staff at William.Stevens@noaa.gov or at 707-575-6066. The purpose of the contact is to review the activities resulting in take, determine if additional protective measures are required, and ensure appropriate collection and transfer of salmonid mortalities and tissue samples.
- All salmonid mortalities will be retained until further direction is provided by the NMFS biologist (listed above).
- Non-native fish that are captured during fish relocation activities shall not be relocated to anadromous fish streams, or areas where they could access anadromous fish habitat.

The following terms and conditions implement reasonable and prudent measure 2:

- Corps, RCD, or the contractor will allow any NMFS employee(s) or any other person(s) designated by NMFS to accompany field personnel to visit the project site during activities described in this opinion.
- A biologist shall monitor in-channel activities and performance of sediment control or detention devices for the purpose of identifying and reconciling any condition that could adversely affect salmonids or their habitat. The Corps, RCD or contractor will rectify conditions that adversely affect salmonids or their habitat in a timely manner, if they occur.
- Contractors must have a supply of erosion control materials, and fuel and hydraulic fluid spill containment supplies onsite to facilitate a quick response to unanticipated storm events, or fuel or hydraulic spill emergencies.
- The Corps and its permittee shall ensure that fill material for cofferdams will be fully confined with the use of plastic sheeting, sheetpiles, sandbags, or with other nonporous containment methods, such that sediment does not come in contact with stream flow or in direct contact with the natural streambed. Alternatively, clean gravel or clean crushed stone may be used without plastic sheeting, sandbags, etc.

The following terms and conditions implement reasonable and prudent measure 3:

- The annual Program status report (section 1.3.5) must be submitted electronically to NMFS biologist William Stevens at William.Stevens@noaa.gov. Reports prepared for compliance with other agency requirements that contain the information requested below would be acceptable. The report must contain, at minimum, the following information:
- Construction related activities. The report must include the conservation practice, dates construction began and was completed; a discussion of any unanticipated effects or unanticipated levels of effects on salmonids, including a description of any and all measures taken to minimize those unanticipated effects and a statement as to whether or not the unanticipated effects had any effect on ESA-listed fish; the number of salmonids killed or injured during the project action; and photographs taken before, during, and after the activity from photo reference points.
- Fish relocation. The report(s) must include a description of the location from which fish were removed and the release site(s) including photographs; the date and time of the relocation effort; a description of the equipment and methods used to collect, hold, and transport salmonids; the number of fish relocated by species; the number of fish injured or killed by species and a brief narrative of the circumstances surrounding ESA-listed fish injuries or mortalities; and a description of any problems which may have arisen during the relocation activities and a statement as to whether or not the activities had any unforeseen effects.
- The Corps and RCD shall provide a written report to NMFS by January 31 of the year following Program completion (i.e., January 2032).
- The report shall be submitted electronically to Mandy Ingham, Central Coast Branch Supervisor at Mandy.Ingham@noaa.gov.
- The report shall contain, at a minimum, the following information:
- Program Summary. The report shall summarize all conservation practices implemented from 2022-2031. The report shall document the number and type of conservation practices, the year implemented, the acres restored, the tons-per-acre-per year of sediment retained, the miles of salmonid habitat improved and any other benefits of the Program to habitat enhancement. The report shall include a map of the location(s), type, and year implemented of each conservation practice. The report shall assess and evaluate the implementation of the Program for improving salmonid populations and habitat conditions in Santa Cruz County by documenting trends in water quality, species abundance and distribution, and habitat complexity.
- Photo monitoring. Projects implemented under the Program will be monitored for effectiveness at achieving conservation practice goals and objectives. Photo documentation pre- and post-project will be conducted for Tier III projects for a period of five years following completion of construction. Photo documentation of Tier I and II projects will occur pre- and post-construction, and once more within the life of the Program.
- Habitat monitoring. The Program will monitor changes in habitat conditions. Any, and all, qualitative data such as bank stability index, vegetative cover, habitat typing, channel

profile, or relevant survey data will be conducted and summarized in the report.
- The report shall evaluate the effectiveness and efficiency of the tiered approach for project complexity and notification. The report will identify any inconsistencies, drawbacks, and/or improvements.

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 conservation recommendations as this time.

2.11 Reinitiation of Consultation

This concludes formal consultation for the renewal of Regional General Permit 13 for Santa Cruz Countywide Partners in Restoration Permit Coordination Program.

As 50 CFR 402.16 states, 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 if: (1) The amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the 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 (4) a new species is listed or critical habitat designated that may be affected by the action.

3 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

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). Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect 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 descriptions of EFH for Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

EFH managed under the Pacific Coast Salmon FMP (PFMC 2014) would be adversely affected by the Project. The Project action area is located in a freshwater area that supports spawning and thermal refugia Habitat Areas of Particular Concern (HAPCs) for coho salmon managed within the Pacific Coast Salmon FMP (PFMC 2014).

3.2 Adverse Effects on Essential Fish Habitat

NMFS determined the Project would adversely affect EFH for Pacific Coast Salmon species (coho salmon). The potential adverse effects of the Project on EFH have been described in the preceding biological opinion and include loss of instream cover and riparian shade; dewatering of stream reaches; turbidity and sedimentation; toxic chemicals; degraded water quality, benthic disturbance, reduction in streamflow, long-term changes in stream beds and banks, and loss of riparian vegetation. As described in the biological opinion above, degraded water quality, benthic disturbance, and loss of riparian vegetation effects are anticipated to be temporary and minor. Permanent adverse impacts will include minor amounts of bank hardening.

3.3 Essential Fish Habitat Conservation Recommendations

Based on information developed in our effects analysis (see preceding biological opinion), NMFS has determined that the proposed action would adversely affect EFH for CCC coho salmon, which are managed under the Pacific Salmon FMP. Although adverse effects are anticipated as a result of the Project, the proposed minimization and avoidance measures, and best management practices described in the accompanying biological opinion are sufficient to avoid, minimize, and/or mitigate for the anticipated effects. Therefore, no additional EFH Conservation Recommendations are necessary at this time that would otherwise offset the adverse effects to EFH.

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)). This concludes the MSA portion of this consultation.

4 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the Corps. Other interested users could include CDFW, City of Santa Cruz, and other local stakeholders. Individual copies of this opinion were provided to the Corps and RCD. The document will be available within two weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adheres 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 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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