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

Issuance of ESA Section 10(a)(1)(A) Enhancement of Survival Permit #26568

NMFS Consultation Number: WCRO-2022-01430

NMFS FRN File Number: 151422WCR2022SR00134

Action Agency: NOAA's National Marine Fisheries Service

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 coho salmon (*Oncorhynchus kisutch*)	Endangered	Yes	No	No	No
Northern California steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	No	No
Central California Coast steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	No	No

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

Issued By:

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Date: October 17, 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 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 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 Coast Office in Santa Rosa, California.

1.2. Consultation History

On April 8, 2022, NMFS received an application from the California Department of Fish and Wildlife (CDFW) (applicant) for an ESA Section 10(a)(1)(A) Enhancement of Survival permit for endangered Central California Coast (CCC) Evolutionarily Significant Unit (ESU) of coho salmon (*Oncorhynchus kisutch*) and threatened Northern California (NC) steelhead Distinct Population Segment (DPS) (*O. mykiss*) and CCC steelhead DPS (*O. mykiss*) (CDFW 2022). Although the proposed activities are to enhance the conservation of endangered coho salmon and threatened steelhead, the actions would nonetheless result in take of the species. Accordingly, NMFS prepared this biological opinion to assess the effects of authorizing the requested type and amount of take on the CCC coho salmon ESU and the NC and CCC steelhead DPSs. This biological opinion is based on the best scientific and commercial data available, including the description of the enhancement activities (CDFW 2022), a knowledge of and experience in the watershed and streams where the enhancement activities will be conducted, and expected effects of the activities on coho salmon and steelhead.

On July 5, 2022, the United States District Court for the Northern District of California issued an order vacating the 2019 regulations adopting changes to 50 CFR part 402 (84 FR 44976, August 27, 2019). This consultation was initiated when the 2019 regulations were still in effect. As reflected in this document, we are now applying the section 7 regulations that governed prior to adoption of the 2019 regulations. For purposes of this consultation, we considered whether the substantive analysis and its conclusions regarding the effects of the proposed actions articulated in the biological opinion and incidental take statement would be any different under the 2019 regulations. We have determined that our analysis and conclusions would not be any different.

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).

We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not. The proposed federal action involves NMFS issuing a 10-year ESA Section 10(a)(1)(A) research and enhancement permit #26568 for the applicant. The applicant has requested non-lethal take of juvenile and adult coho salmon and steelhead, tissue sampling, permission to recover carcasses, and implanting fish with passive integration transponder (PIT) tags. Permit 26568 involves enhancing the survival of endangered CCC coho salmon and threatened NC and CCC steelhead through two elements: 1) rescue and relocation, 2) ecological research, and 3) monitoring. This permit focuses on enhancing the survival, abundance, and genetic diversity of critically endangered CCC coho salmon within coastal populations from Punta Gorda in Humboldt County and including all coastal watersheds southward through Redwood Creek, Marin County, by rescuing and relocating fish at risk of becoming stranded in dewatered stream reaches. Steelhead encountered while rescuing coho salmon may also be rescued and relocated. Research and monitoring elements of coho salmon will be implemented opportunistically. The following is a summary of the rescue, research, and monitoring activities and the amount of take requested (CDFW 2022).

1.3.1. Coho Salmon and Steelhead Rescue and Relocation

The permit would grant CDFW and other co-investigators identified in permit #26568 the ability to conduct coho salmon and steelhead rescues and the collection of tissue samples. Rescue and relocation of coho salmon and steelhead will occur in stream sections experiencing dewatering or poor water quality during the dry season or prolonged periods of below-average rainfall. Authorized staff will follow a predetermined communication and documentation protocol while implementing these relocation efforts. Standard scientific methods and equipment (e.g., backpack-electrofishing, nets, seines, portable air pumps, transport containers, water chillers, etc.) will be used during the capture and relocation of coho salmon and steelhead. Captured salmonids will be transported for release into habitats within the same watershed (when possible) that are determined likely to maintain adequate water and habitat quality through the remainder of the dry season. The criteria for determining when a rescue is warranted are outlined in the NMFS-CDFW Anadromous Fish Rescue Strategy (2021) and the California Endangered Species Act Memorandum of Understanding issued to NMFS WCR by CDFW. The decision to proceed with a rescue and relocation operation will be based on the existence of any of the following conditions:

1. Observed or expected natural streamflow reduction that creates an imminent risk of habitat dewatering.
2. Documented or expected water quality characteristics (i.e., temperature or concentration of dissolved oxygen) that are known or believed to be harmful or lethal to the species.
3. Stream characteristics that increase the potential for predation or poaching that would eliminate most or all of the coho salmon and steelhead contained within discrete mesohabitats.

4. Observed or expected anthropogenic streamflow reduction that cannot or will not be halted to avoid an imminent risk of instream dewatering.
5. A "suitable" relocation area exists (characteristics of relocation areas are described later in this application).
6. The rescue and relocation would represent a meaningful contribution to the enhancement of the endangered CCC coho salmon ESU (e.g., factors to be considered include the number and life stage of the at-risk individuals), and
7. All reasonable options for ameliorating the need for a rescue have been considered.

Before a rescue, CDFW or co-investigator will identify the life stages needing rescue to determine a logical relocation location. The selected relocation area must be capable of accommodating additional coho salmon and steelhead without creating detrimental effects (e.g., significantly increased competition for food, space, or cover) to individuals residing in or near the relocation area and possess sufficient space, complex cover, or shelter, water quality, and access to food. The possible relocation areas are as follows:

1. Instream areas within the same stream;
2. Instream areas in a different stream within the same watershed;
3. Estuary within the same watershed;
4. Instream areas or estuary within an adjacent watershed; and
5. Ocean.

Unspawned adults will be relocated upstream to viable spawning habitat within the stream where captured. Smolts and age-1 fish, individuals will be placed in the estuary or the farthest downstream reach where viable habitat exists. Age-0 fish will be placed in upstream reaches or estuary habitats where they can over-summer.

When possible a seine net (i.e., beach seine and dip net) may be used to rescue fish. To prevent fish from leaving the sampled habitat, block nets may be installed at the upstream and downstream boundary of the habitat prior to seining. Dip nets may be used to collect coho salmon and steelhead from shallow habitats. Any coho salmon or steelhead captured during a seine haul will be kept separate from other species in a container (minimum 5-gallon) with supplemental aeration, or in floating live cars, as appropriate.

When seine nets are impractical, then electrofishing will be used to capture fish. Backpack electrofishing will be conducted in stream locations that can be waded safely. Block-nets may be used to prevent fish from leaving and aiding in the capture of any stunned fish that drift downstream. Only field supervisors and crew members with appropriate training and experience will operate the electrofishing equipment. Electrofishing settings will be limited to only the minimum settings necessary for effectively capturing fish to further minimize impacts. Coho salmon and steelhead captured will be temporarily kept in either a container (minimum 5-gallon) with supplemental aeration or in floating live cars as appropriate.

1.3.2. Scientific Research

Permit #26568 would allow for specific staff listed on the permit to implement specified research. Authorized research activities could include any of the following: 1) salvaging carcasses or tissue samples to assess age, growth, and other life history information; and 2) tagging of natural origin coho salmon juveniles to track freshwater movements, survival, and growth. Standard scientific methods and procedures (e.g., PIT-tagging, fin-clip/DNA analysis, scale sampling, otolith collection and analysis, temporary anesthesia etc.) are proposed for implementing these research elements.

Juvenile coho salmon that are sampled for tissues and/or PIT tagged, will be anesthetized/sedated with either Alka Seltzer Gold (anhydrous citric acid, sodium bicarbonate, potassium bicarbonate) or MS-222 (tricaine methanesulfonate) and then released when recovered. If Alka Seltzer Gold is used, fish will be closely observed in the anesthetic/sedative bath until loss of equilibrium is achieved, but operculum movement is still present. A fresh stock solution using one tablet of Alka Seltzer Gold dissolved in 1-2 gallons of fresh stream water and diluted as appropriate will be used for each new sampling event. The lowest concentration of Alka Seltzer Gold active ingredients that will permit safe handling will be used. If MS-222 is used, fish will be closely observed in the anesthetic bath until loss of equilibrium is achieved, but operculum movement is still present. Each tagging or tissue event will have a fresh 1% stock solution of buffered (sodium bicarbonate) MS-222 and dilute the stock solution as appropriate. The lowest concentration of MS-222 that will permit safe handling will be used (typically 60 ppm buffered MS-222). The anesthetized/sedated juvenile (young-of-the-year) salmonids will be in plastic buckets in groups of 5-10 fish, whereas larger parr and smolts will be anesthetized in groups of 1-2 fish. Stress Coat may be added to the anesthetic/sedative solution as needed to combat stress from loss of the protective slime layer during handling. Fish will be allowed to recover in aerated stream water until normal behavior is observed. Water temperature in the recovery buckets or tubs will be monitored and maintained within 2°C of the ambient water temperature.

Fin clips may be collected from natural origin coho salmon juveniles (> 50 mm fork length) for genetic analysis when environmental conditions of the rescue location are not causing fish stress (i.e. suitable water and air temperatures, suitable dissolved oxygen, suitable turbidity range). Following anesthetization/sedation, less than 10 mm^2 of material will be excised from the tip of the caudal fin using scissors. The fin clip is transferred to filter paper, placed in a labeled sample envelope, and desiccated. If conditions are suitable for genetic sampling, scale samples may be collected from natural origin coho salmon juveniles (> 60 mm fork length) for age and life history determination. After anesthetization/sedation, scales are collected from a restricted area above the lateral line behind the dorsal fin by scraping the area with a small knife (juveniles). Samples (10-15 scales per fish) are transferred to blotter paper, placed in a labeled sample envelope, and desiccated.

If adult carcasses are encountered during rescue or relocation activities, individuals will be scanned for the presence of tags (coded-wire or PIT), and heads or whole bodies may be retained for tag extraction and otolith collection (adult carcass). Adult carcasses will be sampled for basic measurements (i.e., length, mass, body depth), DNA (fin clip), otoliths, and tag recoveries (including PIT and CWT's). Adult carcasses left in the streams will receive a jaw tag.

Natural origin coho salmon juveniles greater than 65 mm fork length may be implanted with a 12 mm PIT tag. Following anesthetization/sedation and loss of equilibrium, a small incision (1-2 mm) is made in the abdomen with a scalpel, followed by manual insertion of a PIT tag. The PIT tag is massaged into place, and the fish is then placed into an aerated recovery tank, where it will be revived and later released to the wild. The movement of PIT-tagged fish is monitored using stationary and potentially portable PIT-tag antenna systems or handheld pit tag scanners. Portable backpack antennas allow for individual sample units to be interrogated for the presence of PIT-tagged fish. The antennas detect PIT-tags as tagged individuals move within proximity to the submerged antenna. The second type of antenna is a fixed antenna system. Fixed systems span some portion or the entire width of the creek and detect each PIT-tag as a tagged fish swims through the antenna.

1.3.3. Minimization Measures

Only trained staff and named staff in permit #26568 are authorized to lead the rescue/relocation, research, and monitoring activities. However, other individuals (not named in permit #26568) may assist in the efforts in the manner and extent of this assistance will be determined by the field lead. The specific CDFW or co-investigator representatives engaging in the fish rescue and relocation must possess expertise in anadromous salmonid species identification, biology, ecology, fish-habitat relationships, and handling, collecting, and relocating salmonid species. This experience must include applying measures to minimize stress and injury related to rescue and relocation operations and experience using capture methods. Only field equipment that has been thoroughly decontaminated following CDFW protocols for elimination of quagga mussel, New Zealand Mud Snail, and various pathogens or diseases will be used.

To minimize the likelihood that salmonids would be harmed or killed during a rescue and relocation operation, the following measures will be implemented:

1. Allow only people with sufficient experience and training in salmonid species identification, salmonid capture techniques, and capture equipment;
2. Minimize turbidity in the rescue area by limiting foot traffic;
3. Use block nets to enclose the rescue area as necessary and appropriate;
4. Place coho salmon and steelhead in a holding container with well-oxygenated, cool stream water;
5. Monitor and maintain suitable oxygen and temperature levels in holding containers;
6. Minimize physical disturbance and thermal changes to holding containers;
7. Acclimate fish in holding containers to relocation areas;
8. Minimize overcrowding in holding containers; and
9. Ensure lids are secured to holding containers during transport.

In addition to the above, the risk of injury or unintentional mortality will be minimized by: (1) following the rescue protocols designed to minimize injury or mortality, (2) revising methods or stopping collections if unacceptable levels of mortality arise, and (3) having rescues conducted by trained and experienced biologists.

Field activities associated with the various proposed enhancement components can occur year-round between the date of permit issuance (anticipated to be September 2022) and December 31, 2032. NMFS expects that the number of CCC coho salmon and NC/CCC steelhead handled during rescues in any given year will vary substantially. The annual sum of salmonids requested across the various components of this effort is as follows: (1) non-lethal capture and release of up to 20,000 juvenile natural origin coho salmon, 9,000 hatchery origin juvenile coho salmon, 6,000 natural origin juvenile NC steelhead, and 10,000 natural origin juvenile CCC steelhead while electrofishing, seining, or dip-netting, (2) non-lethal capture and release of up to 1500 juvenile natural origincoho salmon to apply Passive Integrated Transponder-tags (PIT-tags) and collect tissue samples, (3) non-lethal capture and release of up to 200 natural origin adult coho salmon, 200 hatchery origin adult coho salmon, 300 natural origin adult NC steelhead, and 300 natural origin adult CCC steelhead by beach seine, (4) tissue collection from up to 1000 adult natural origin coho salmon, 1000 hatchery origin coho salmon, 500 adult natural origin NC steelhead, and 500 adult natural origin CCC steelhead carcasses. The potential annual unintentional lethal coho salmon and steelhead take expected from the proposed enhancement activities is up to 2,000 natural origin juvenile coho salmon, 900 hatchery origin juvenile coho salmon, 600 natural origin juvenile NC steelhead, 1000 natural origin juvenile CCC steelhead, 20 natural origin adult coho salmon, 20 hatchery origin adult coho salmon, 30 natural origin adult NC steelhead, and 30 natural origin adult CCC steelhead. These estimates assume up to a 10 percent indirect mortality rate Table 1.

Table 1: The annual sum of take proposed across the various components of Permit 26568

Line	Species/Listing Status	Origin	Lifestage	Sex	Authorized Take	Authorized Indirect Mortality	Take Action	Observe/Collect Method	Procedures
1	Central California Coast ESU (Endangered)	Natural	Juvenile	Male and Female	20000	2000	Capture/Handle/Release Animal	Siene Net, Dip Net, Backpack Electrofishing	
2	Central California Coast ESU (Endangered)	Natural	Juvenile	Male and Female	1500	150	Capture/Mark, Tag, Sample Tissue/Release Live Animal	Siene Net, Dip Net, Backpack Electrofishing	Anesthetize; Tag, PIT; Tissue Sample Fin or Opercle; Tissue Sample Scale
3	Central California Coast ESU (Endangered)	Listed Hatchery Intact Adipose	Juvenile	Male and Female	9000	900	Capture/Handle/Release Animal	Siene Net, Dip Net, Backpack Electrofishing	
4	Central California Coast ESU (Endangered)	Natural	Adult	Male and Female	200	20	Capture/Handle/Release Animal	Seine, Beach	
5	Central California Coast ESU (Endangered)	Listed Hatchery Intact Adipose	Adult	Male and Female	200	20	Capture/Handle/Release Animal	Seine, Beach	
6	Central California Coast ESU (Endangered)	Natural	Spawned Adult/ Carcass	Male and Female	1000	0	Observe/Sample Tissue Dead Animal	Hand/Spatula/Knife	Tissue Sample Fin or Opercle; Tissue Sample Otolith; Tissue Sample Scale
7	Central California Coast ESU (Endangered)	Listed Hatchery Intact Adipose	Spawned Adult/ Carcass	Male and Female	1000	0	Observe/Sample Tissue Dead Animal	Hand/Spatula/Knife	Tissue Sample Fin or Opercle; Tissue Sample Otolith; Tissue Sample Scale
8	Central California Coast DPS (Threatened)	Natural	Juvenile	Male and Female	10000	1000	Capture/Handle/Release Animal	Siene Net, Dip Net, Backpack Electrofishing	
9	Central California Coast DPS (Threatened)	Natural	Adult	Male and Female	300	30	Capture/Handle/Release Animal	Seine, Beach	
10	Central California Coast DPS (Threatened)	Natural	Spawned Adult/ Carcass	Male and Female	500	0	Observe/Sample Tissue Dead Animal	Hand/Spatula/Knife	Tissue Sample Fin or Opercle; Tissue Sample Otolith; Tissue Sample Scale
11	Northern California DPS (Threatened)	Natural	Juvenile	Male and Female	6000	600	Capture/Handle/Release Animal	Siene Net, Dip Net, Backpack Electrofishing	
12	Northern California DPS (Threatened)	Natural	Adult	Male and Female	300	30	Capture/Handle/Release Animal	Seine, Beach	
13	Northern California DPS (Threatened)	Natural	Spawned Adult/ Carcass	Male and Female	500	0	Observe/Sample Tissue Dead Animal	Hand/Spatula/Knife	Tissue Sample Fin or Opercle; Tissue Sample Otolith; Tissue Sample Scale

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

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

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

2.1. Analytical Approach

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

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

The designation(s) of critical habitat for CCC coho, and NC and 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 part 424) 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.

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

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

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

2.2. Rangewide Status of the Species and Critical Habitat

This biological opinion examines the status of each species that is likely to be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' "reproduction, numbers, or distribution" for the jeopardy analysis. The biological 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.

Endangered Central California Coast Coho (CCC) salmon (*Oncorhynchus kisutch*)
- Listing determination (70 FR 37160; June 28, 2005)
- Critical habitat designation (64 FR 24049; May 5, 1999);

Threatened California Coastal (CC) Chinook salmon (*O. tshawytscha*)
- Listing determination (70 FR 37160; June 28, 2005)
- Critical habitat designation (70 FR 52488; September 2, 2005);

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

Threatened Central California Coast (CCC) steelhead (*O. mykiss*)
- Listing determination (71 FR 834; January 5, 2006)
- Critical habitat designation (70 FR 52488; September 2, 2005).

2.2.1. Species Description and Life History

2.2.1.1 Coho Salmon

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

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

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

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

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

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

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

2.2.1.2 Steelhead

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

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

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

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

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

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

Water temperature can influence the metabolic rate, distribution, abundance, and swimming ability of rearing juvenile steelhead (Barnhart 1986, Bjornn and Reiser 1991, Myrick and Cech 2005). Optimal temperatures for steelhead growth range between 50° and 68° F (Hokanson et al. 1977, Wurtsbaugh and Davis 1977, Myrick and Cech 2005). Variability in the diurnal water temperature range is also important for the survivability and growth of salmonids (Busby et al. 1996). Suspended sediment concentrations, or turbidity, also can influence the distribution and growth of steelhead (Bell 1973, Sigler et al. 1984, Newcombe and Jensen 1996). Bell (1973) found suspended sediment loads of less than 25 milligrams per liter (mg/L) were typically suitable for rearing juvenile steelhead.

2.2.2. Species Status

2.2.2.1 CCC Coho Salmon

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

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

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

2.2.2.2 NC Steelhead

With few exceptions, NC steelhead are present wherever streams are accessible to anadromous fish and have sufficient flows. The most recent status review (NMFS 2016) reports that available information for winter-run and summer-run populations of NC steelhead do not suggest an appreciable increase or decrease in extinction risk since publication of the previous status review update in 2011 (NMFS 2011). Williams et al. (2016) found that population abundance was very low relative to historical estimates, and recent trends are downwards in most stocks.

NC steelhead remain broadly distributed throughout their range, with the exception of habitat upstream of dams on both the Mad River and Eel River, which has reduced the extent of available habitat. Extant summer-run steelhead populations exist in Redwood Creek and the Mad, Eel (Middle Fork) and Mattole Rivers. The abundance of summer-run steelhead was considered "very low" in 1996 (Good et al. 2005), indicating that an important component of life history diversity in this DPS is at risk. Hatchery practices in this DPS have exposed the wild population to genetic introgression and the potential for deleterious interactions between native stock and introduced steelhead. However, abundance and productivity in this DPS are of most concern, relative to NC steelhead spatial structure and diversity (Williams et al. 2011). The most recent status review for NC steelhead (NMFS 2016) concludes NC steelhead, despite recent conservation efforts, remain impacted by many of the factors that led to the species being listed as threatened. Low streamflow volume, illegal cannabis cultivation, and periods of poor ocean productivity continue to depress NC steelhead population viability.

2.2.2.3 CCC Steelhead

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

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

A recent viability assessment of CCC steelhead concluded that populations in watersheds that drain to San Francisco Bay are highly unlikely to be viable, and that the limited information available did not indicate that any other CCC steelhead populations were demonstrably viable (Spence et al. 2008). Although there were average returns (based on the last ten years) of adult CCC steelhead during 2007/08, research monitoring data from the 2008/09 and 2009/10 adult CCC steelhead returns show a decline in returning adults across their range compared to the previous ten years. The most recent status update concludes that steelhead in the CCC DPS remain "likely to become endangered in the foreseeable future," as new and additional information does not appear to suggest a change in extinction risk (NMFS 2016d).

2.2.3. Status of Critical Habitat

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

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

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

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

PBFs for NC, and CCC steelhead critical habitat, and their associated essential features 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.

The condition of CCC coho salmon and NC, CCC steelhead critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS's recovery plans for CCC coho and NC and CCC steelhead have determined that currently depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat[1]: logging, agriculture, mining, urbanization, stream channelization, dams, wetland loss, and water withdrawals (including unscreened diversions for irrigation) (NMFS 2012, NMFS 2016). Impacts of concern include altered stream bank and channel morphology, elevated water temperature, lost spawning and rearing habitat, habitat fragmentation, impaired gravel and wood recruitment from upstream sources, degraded water quality, lost riparian vegetation, and increased erosion into streams from upland areas (Weitkamp et al. 1995, Busby et al. 1996, NMFS 2012, NMFS 2016, 64 FR 24049; 70 FR 37160; 70 FR 52488). Diversion and storage of river and stream flow has dramatically altered the natural hydrologic cycle in many of the streams within the ESU/DPSs (NMFS 2012, NMFS 2016). As identified in the NMFS recovery plans for these species, altered flow regimes can delay or preclude migration, dewater aquatic habitat, and strand fish in disconnected pools, while unscreened diversions can entrain juvenile fish (NMFS 2012, NMFS 2016).

2.2.4. Additional Threats to CCC Coho Salmon, NC and CCC Steelhead

One factor affecting the range-wide status of the steelhead, salmon, and their aquatic habitat at large is climate change. Impacts from global climate change are already occurring in California. For example, average annual air temperatures, heat extremes, and sea level have all increased in California over the last century (Kadir et al. 2013). Snow melt from the Sierra Nevada has declined (Kadir et al. 2013). While, CCC coho, NC and CCC steelhead populations are not dependent on snowmelt driven streams and thus not affected by declining snow packs, they may have already experienced some detrimental impacts from climate change.

The threat to CCC coho and NC and CCC steelhead from global climate change is expected to increase in the future and is already materializing in the form of prolonged drought, changes in the timing and magnitude of storms, their runoff, and dry season streamflow. 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).

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

Similarly, wildfires are expected to increase in frequency and magnitude (Westerling et al. 2011; Moser et al. 2012).

Shifting climate patterns across coastal California may impair future salmon and steelhead population productivity. For example, in the San Francisco Bay region, warm temperatures generally occur in July and August but as climate change takes hold, the occurrences of these events will likely begin in June and could continue to occur in September (Cayan et al. 2012). Climate simulation models project that the San Francisco region will maintain its Mediterranean climate regime, but will also experience a higher degree of variability of annual precipitation during the next 50 years. The greatest reduction in precipitation is projected to occur in March and April, with the core winter months remaining relatively unchanged (Cayan et al. 2012). The action area experienced a multi-year drought in 2012-2016, resulting in low instream flows, especially in the low flow season (June-October). More recently, low instream flows in summer 2021 likely led to poor survival of juvenile coho salmon and steelhead. The precipitation in late 2021 improved overall streamflow on the central California coast; however, due to an extremely dry period in January-March 2022, drought conditions are expected for the remainder of 2022 and possibly in subsequent years during the timeframe of the permit.

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

Finally, climate change also affects water circulation and temperature patterns in the marine environment. In the fall of 2014 and again in 2019, a marine heatwave, known as "The Blob"[2], 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. Salmonids utilize the marine waters in this region of the ocean 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 proposed action will take place throughout the coastal streams from within the CCC coho salmon ESU, from Punta Gorda, Humboldt County, through Redwood Creek in Marin County.

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

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).

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

For the most part, the action area has a Mediterranean climate characterized by cool, wet winters with typically high runoff and dry, warm summers characterized by low instream flows. Fog is a dominant climatic feature along the coast, generally occurring daily in the summer and not infrequently throughout the year. Higher elevations and inland areas tend to be relatively fog free. Most precipitation falls during the winter and early spring as rain, with occasional snow at higher elevations, especially in the interior mountainous regions of northern California. Average air temperatures range from 46° to 56° F along the coast. Further inland and in the southern part of the action area, annual air temperatures are much more varied, ranging from below freezing in winter to over 100° F during the summer months. The action area will change under the future climate change predictions. See the status of the species (section 2.3) for more information. High seasonal rainfall on bedrock and other geologic units with relatively low permeability, erodible soils, and steep slopes contribute to the flashy nature (stream flows rise and fall quickly) of the watersheds within the action area. In addition, extensive road systems and other land uses have increased these high natural runoff rates. High seasonal rainfall and rapid runoff rates on unstable soils deliver large amounts of sediment to river systems. As a result, many river systems within the action area contain a relatively large sediment load, typically deposited throughout the lower gradient reaches of these systems.

2.4.1. Status of, and Factors Affecting, the Species and Critical Habitat in the Action Area

This section provides a synopsis of the geographic area of consideration, the ESU/DPSs and watersheds present, specific recent information on the status of salmon and steelhead, and a summary of the factors affecting the listed species within the action area. The best information presently available demonstrates that a multitude of factors, past and present, have contributed to the decline of west coast salmonids (NMFS 2012, 2016). The following summarizes the factors affecting the environment of the species or critical habitat.

The action area includes all coastal California streams entering the Pacific Ocean in Mendocino, Sonoma, and Marin counties. The action area includes five USGS 4th field HUCs (Big-Navarro-Garcia, Bodega Bay, Gualala-Salmon, Russian, and Tomales-Drakes Bay). Forestry is the dominant land-use throughout the northern part of this area (north of the Russian River). Agriculture and urbanization are more predominant in the Russian River and areas south to Redwood Creek.

Excessive sedimentation, low large wood abundance and recruitment, lack of floodplain access, and elevated water temperature are issues limiting salmonid habitat throughout watersheds draining the Mendocino County coast and are generally attributable to historic and ongoing forestry activities. The watersheds in the Russian River have low wood densities, lack of access to the floodplain, low water flows and high-water temperatures in the dry season. The dominant land use is urbanization and agriculture. Within the Russian River watershed, Coyote Valley Dam and Warm Springs Dam block access to upstream anadromous fish habitat, alter sediment transport dynamics, and degrade water flow and temperature. Steiner Environmental Consulting (1996) cites unpublished data from the California State Water Resource Control Board that estimates over 500 small, private dams within the watershed. A number of those dams have been removed in the last two decades. Historically, the Don Clausen Fish Hatchery, operated at Warm Springs Dam, released coho salmon, Chinook salmon, and steelhead into the Russian River watershed. However, significant changes in hatchery operations began in 1998, in which the production of coho salmon and Chinook salmon was discontinued. Traditional production of steelhead continues at Don Clausen Fish Hatchery. Beginning in 2004, a consortium of federal agencies, state agencies, and local non-profit groups began the Russian River Coho Salmon Captive Broodstock Program at the same hatchery, which raises and releases hatchery-reared juvenile coho salmon into local watersheds.

Most of the watersheds feeding Tomales and Drakes bay are small, except for Walker Creek and Lagunitas Creek. Flood control activities, contaminated runoff from paved lots and roads, and seepage from improperly designed and/or maintained septic systems continue to impact habitat and water quality in portions of these watersheds. (Ketcham 2003). The construction of Kent Reservoir and Nicasio Reservoir on Lagunitas Creek blocked access to half of the historical salmonid habitat. Similarly, Soulejoule Reservoir precludes access to a significant amount of headwater stream habitat within the remainder of the watershed (NMFS 2012, NMFS 2016). Overwinter habitat is limiting within Lagunitas Creek primarily due to a lack of large woody recruitment and limited floodplain engagement (NMFS 2016). Within Walker Creek, high fine sediment concentrations lower pool depth and density, while also embedding spawning gravel.

Steelhead are generally widely distributed throughout the basins, although abundance levels are far below recovery targets. In most years, coho salmon persist in very small numbers throughout the area, although in the spring of 2022, coho have been observed in almost every stream.

2.4.1.1 Ongoing Drought

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

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

2.4.1.2 Climate Change

Climate change will impact the forests of the western U.S., which dominate the landscape of many watersheds in the region. Forests are already showing evidence of increased drought severity, forest fire, and insect outbreak (Halofsky et al. 2020). Climate change will also affect tree reproduction, growth, and phenology, leading to spatial shifts in vegetation. Halofsky et al. (2018) projected that the largest changes will occur at low- and high-elevation forests, with expansion of low-elevation dry forests and diminishing high-elevation cold forests and subalpine habitats.

The effects of climate change will be more pronounced further inland and in the more southern sections of the action area. CCC coho salmon, CCC steelhead will be most affected by the changing climate (Crozier et al 2019). Many of these changes are likely to further degrade 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. NC steelhead will likely be affected less so because of its more northern DPS (Crozier et al 2019). The latest climate models project a warming of 0.18°F to 1.08°F per decade over the next century. Recent evidence suggests that climate and weather is expected to become more extreme, with an increased frequency of drought, wildfires and flooding (IPCC 2019). Water temperatures will reach extremes during the summer months with the combined effect of reduced flow and warmer air temperatures. These long-term effects may include, but are not limited to, depletion of cold water habitat, variation in quality and quantity of tributary rearing habitat, alterations to migration patterns, accelerated embryo development, premature emergence of fry, increased bio-energetic and disease stresses on fish, and increased competition among species.

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

2.4.2. Previous Section 7 Consultations and Section 10 Permits in the Action Area

Given the large spatial area where individual rescue/relocation, monitoring, and research may occur, many past Section 7 consultations and Section 10 permits have occurred within the action area. The majority of the consultations were informal and did not adversely affect listed species.

A low number of formal biological opinions are produced each year that authorize take and have terms and conditions that minimize take of listed anadromous fish.

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

2.5.1. Effects on Critical Habitat

Full descriptions of the effects of the proposed enhancement and research activities are in the following sections. Generally, the permitted activities would be: 1) electrofishing; 2) capturing fish using nets of various types; 3) collecting biological samples from live juvenile coho salmon; and 4) PIT tagging. All of these techniques are minimally intrusive in terms of their effect on habitat because they would involve very little, if any, disturbance of streambeds or adjacent riparian zones. Some fish collection activities may temporarily disturb substrate, displace benthic invertebrate prey, and increase turbidity just above the water surface. However, such actions affect small spatial areas and are brief in duration, so these effects are expected to be ephemeral and attenuate rapidly. Therefore, none of the activities analyzed in this biological opinion will measurably affect any habitat PBF function or value described earlier (see section 2.2.2).

2.5.2. Effects on the Species

As discussed above, the proposed enhancement and research activities would not have a measurable affect on any of the listed species' habitat. The actions are therefore not likely to measurably affect any of the listed species by reducing that habitat's ability to contribute to their survival and recovery.

Although not identified as a factor for decline or a threat preventing recovery, enhancement and scientific research and monitoring activities can affect the species' survival and recovery by killing listed salmonids—whether intentionally or not. As mentioned above, NMFS has issued numerous section 10(a)(1)(A) scientific research permits allowing listed species to be taken and sometimes killed. NMFS has also issued numerous authorizations for state scientific research programs under ESA section 4(d). Actual take levels associated with these activities are almost certain to be substantially lower than the permitted levels. A primary reason for this is most researchers do not handle the full number of juveniles or adults they are allowed. That is, for the vast majority of scientific research permits, history has shown that researchers generally take far fewer salmonids than the allotted number of salmonids every year.

The authorized activities under the permit are expected to result only in minimal adverse effects while the majority of effects are expected to be beneficial. Coho salmon and steelhead will be subject to direct and indirect effects associated with aspects of the proposed action. The main risk to individual fish involves unintentional harm and mortality during the capture and handling process while conducting rescue, relocation, and research activities. However, this potential harm and mortality is expected to be low and limited to a small proportion of the total CCC coho ESU, NC steelhead DPS and CCC steelhead DPS. Additionally, these activities include measures expected to minimize, if not eliminate, the risk of injury and mortality. Nevertheless, we expect mortality rates to be higher during these rescues than in a routine scientific study. The higher mortality rate is expected because the degraded water quality conditions have likely left the salmonids in a deteriorated state and more susceptible to stress and death. We expect that up to 10% of the rescued fish may die.

Further, the benefits of conducting the authorized activities are expected to more than compensate for the anticipated potential adverse effects to a small number of individual fish. For example, relocating salmonids from naturally dewatering stream reaches is expected to promote survival and growth of individual fish, thereby enhancing the ESU and DPS as a whole. Only fish that are determined to be in danger of mortality due to habitat drying or intolerable water quality will be rescued. The proposed research elements are also expected to produce long-term conservation benefits for the species by informing science-based management of the species, including advanced protection measures through improved monitoring and controls on anthropogenic activities.

2.5.2.1 Fish Capture and Handling

The primary effect of the proposed activities on the listed species would be in the form of capturing and handling fish. We discuss effects from handling and anesthetizing fish, and the general effects of capture using seines and dip-nets here. We discuss effects from backpack electrofishing in more detail below.

Harassment caused by capturing, handling, and releasing fish generally leads to stress and other sub-lethal effects that are difficult to assess in terms of their impact on individuals, populations, and species (Sharpe et al. 1998). Fish handling may cause stress, injury, or death, typically due to overdoses of anesthetic, differences in water temperatures between the river and holding buckets, depleted dissolved oxygen in holding buckets, and holding fish out of the water, and physical trauma. Stress on salmonids increases rapidly from handling if the water temperature exceeds 18ºC or dissolved oxygen is below saturation. Fish transferred to holding buckets can experience trauma if care is not taken in the transfer process, and fish can experience stress and injury from overcrowding in nets and buckets. Decreased survival of fish can result when stress levels are high because stress can be immediately debilitating and may also increase the potential for vulnerability to subsequent challenges (Sharpe et al. 1998). The permit conditions identified in Section 1.3 contain measures that mitigate the factors that commonly lead to stress and trauma from handling, and thus minimize the harmful effects of capturing and handling fish. When these measures are followed, the majority of fish typically recover fairly rapidly from handling. However, NMFS anticipates up to 10% of the fish captured and handled could be killed.

2.5.2.2 Electrofishing

Electrofishing is a process by which an electrical current is passed through water containing fish in order to stun them, which makes them easy to capture. It can cause a suite of effects ranging from disturbing the fish to killing them. The percentage of fish that are unintentionally killed by electrofishing varies widely depending on the equipment used, the settings on the equipment, and the expertise of the technician (Sharber and Carothers 1988, McMichael 1993, Dalbey et al. 1996; Dwyer and White 1997). Research indicates that using continuous direct current (DC) or low-frequency (30 Hz) pulsed DC waveforms produce lower spinal injury rates, particularly for salmonids (Fredenberg 1992, McMichael 1993, Sharber et al. 1994, Snyder 1995).

Most studies on the effects of electrofishing on fish have been conducted on adult fish greater than 300 mm in length (Dalbey et al. 1996). Electrofishing can have severe effects on adult salmonids. Adult salmonids can be injured or killed due to spinal injuries that can result from forced muscle contractions. Sharber and Carothers (1988) reported that electrofishing killed 50 percent of the adult rainbow trout in their study.

Spinal injury rates are substantially lower for juvenile fish than for adults. Smaller fish are subjected to a lower voltage gradient than larger fish (Sharber and Carothers 1988) and may, therefore, be subject to lower injury rates (e.g., Hollender and Carline 1994; Dalbey et al. 1996; Thompson et al. 1997). McMichael et al. (1998) reported a 5.1% injury rate for juvenile Middle Columbia River steelhead captured by electrofishing in the Yakima River subbasin.

When using appropriate electrofishing protocols and equipment settings, shocked fish normally revive quickly. Studies on the long-term effects of electrofishing indicate that even with spinal injuries, salmonids can survive long-term; however, severely injured fish may have stunted growth (Dalbey et al. 1996, Ainslie et al. 1998). The applicant will minimize effects to listed species by using only field supervisors and crew members with appropriate training and experience to operate the electrofishing equipment. To further minimize impacts, methods and electrofishing settings will be limited to only the minimum settings necessary for effectively capturing fish. Coho salmon and steelhead captured will be temporarily kept in either a container (minimum 5-gallon) with supplemental aeration, or in floating live cars as appropriate. Overall, NMFS anticipates up to 10% of fish encountered during electrofishing could be killed.

2.5.2.3 Tagging and Marking

Techniques such as PIT-tagging, and fin-clipping are common to many scientific research efforts using listed species. All sampling, handling, and tagging procedures have an inherent potential to stress, injure, or even kill the marked fish. NMFS anticipates up to 10% of the natural origin juvenile coho salmon tagged and marked could be killed. This section discusses each of the marking processes and its associated risks.

A PIT tag is an electronic device that relays signals to a radio receiver; it allows salmonids to be identified whenever they pass a location containing such a receiver (e.g., any of several dams) without researchers having to handle the fish again. The tag is inserted into the body cavity of the fish just in front of the pelvic girdle. The tagging procedure requires that the fish be captured and extensively handled; therefore, any researchers engaged in such activities will follow the conditions listed previously in this biological opinion (as well as any permit-specific conditions) to ensure that the operations occur in the safest possible manner. In general, the tagging operations will take place where there is high-quality cold water, a carefully controlled environment for administering anesthesia, sanitary conditions, quality control checking, and a carefully regulated holding environment where the fish can be allowed to recover from the operation.

PIT tags have very little effect on growth, mortality, or behavior. The few reported studies of PIT tags have shown no effect on growth or survival (Prentice et al. 1987; Jenkins and Smith 1990; Prentice et al. 1990). For example, in a study between the tailraces of Lower Granite and McNary dams (225 km), Hockersmith et al. (2000) concluded that the performance of yearling Chinook salmon was not adversely affected by gastrically- or surgically-implanted sham radio tags or PIT-tags. Additional studies have shown that growth rates among PIT-tagged Snake River juvenile fall Chinook salmon in 1992 (Rondorf and Miller 1994) were similar to growth rates for salmon that were not tagged (Conner et al. 2001). Prentice and Park (1984) also found that PIT-tagging did not substantially affect survival in juvenile salmonids.

2.5.2.4 Tissue Sampling

Tissue sampling techniques such as fin-clipping are common to many scientific research efforts using listed species. All sampling, handling, and clipping procedures have an inherent potential to stress, injure, or even kill the fish. This section discusses tissue sampling processes and its associated risks.

Fin clipping is the process of removing part or all of one or more fins to obtain non-lethal tissue samples and alter a fish's appearance (and thus make it identifiable). When entire fins are removed, it is expected that they will never grow back. Alternatively, a permanent mark can be made when only a part of the fin is removed or the end of a fin or a few fin rays are clipped. Although researchers have used all fins for marking at one time or another, the current preference is to clip the adipose, pelvic, or pectoral fins. Marks can also be made by punching holes or cutting notches in fins, severing individual fin rays (Welch and Mills 1981), or removing single prominent fin rays (Kohlhorst 1979).

Many studies have examined the effects of fin clips on fish growth, survival, and behavior. The results of these studies are somewhat varied; however, it can be said that fin clips do not generally alter fish growth. Studies comparing the growth of clipped and unclipped fish generally have shown no differences between them (e.g., Brynildson and Brynildson 1967). Moreover, wounds caused by fin clipping usually heal quickly—especially those caused by partial clips.

Mortality among fin-clipped fish is also variable. Some immediate mortality may occur during the marking process, especially if fish have been handled extensively for other purposes (e.g., stomach sampling). NMFS anticipates up to 10% of the natural origin juvenile coho salmon sampled for tissues may be killed. Delayed mortality depends, at least in part, on fish size; small fishes have often been found to be susceptible to it and Coble (1967) suggested that fish shorter than 90 mm are at particular risk. The degree of mortality among individual fishes also depends on which fin is clipped. Studies show that adipose- and pelvic-fin-clipped coho salmon fingerlings have a 100% recovery rate (Stolte 1973). Recovery rates are generally recognized as being higher for adipose- and pelvic-fin-clipped fish in comparison to those that are clipped on the pectoral, dorsal, and anal fins (Nicola and Cordone 1973). Clipping the adipose and pelvic fins probably kills fewer fish because these fins are not as important as other fins for movement or balance (McNeil and Crossman 1979). Mortality is generally higher when the major median and pectoral fins are clipped. Mears and Hatch (1976) showed that clipping more than one fin may increase delayed mortality, but other studies have been less conclusive.

2.6. Cumulative Effects

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

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 proposed action will take place throughout the coastal streams of Mendocino, Sonoma, and Marin counties, California that support endangered CCC coho salmon, threatened NC steelhead and CCC steelhead. CCC coho salmon, NC steelhead, and CCC steelhead 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 and steelhead populations within these diversity strata have declined substantially over the past several decades.

Permit 26568 involves two elements: 1) rescue and relocation of salmonids; and 2) natural origin juvenile coho salmon scientific research. Coho salmon and steelhead are expected to be present in the action area when the proposed action is implemented and, therefore, subject to direct and indirect effects associated with aspects of the proposed action. The main risk to individual coho salmon and steelhead involves effects due to capture and relocation and tagging. The adverse effects include potential injury or mortality during the process of capture and relocation during rescue and study activities, but precautions are in place to minimize the risk of injury and mortality to 10% or less of those fish captured. The potential annual mortality (up to 2,000 natural origin juvenile coho salmon, 900 hatchery origin juvenile coho salmon, 600 natural origin juvenile NC steelhead, 1000 natural origin juvenile CCC steelhead, 20 natural origin adult coho salmon, 20 hatchery origin adult coho salmon, 30 natural origin adult NC steelhead, and 30 natural origin adult CCC steelhead) of fish captured amounts to a minor fraction of CCC coho salmon ESU, NC steelhead DPS, and CCC steelhead DPS total abundance. The total mortalities are small and spread out across multiple diversity strata and are therefore unlikely to have any lasting detrimental effect on the species numbers, reproduction, or distribution. Fish that are otherwise not rescued but for the proposed permit are anticipated to die. Overall, the impacts to the species are expected to be beneficial. The rescue and relocation activities will enhance the survival of individuals and the research activities will improve understanding of coho salmon and steelhead.

Any impacts from the permit activities to critical habitat will be negligible. Wading, seining, netting, and operating an electrofisher in the action area may cause temporary disturbances but would not alter or diminish the conservation value of the critical habitat for CCC coho salmon, NC steelhead or CCC steelhead.

Future climate change could affect CCC coho salmon, NC steelhead and CCC steelhead and their designated critical habitats within the action area. Some potential consequences of climate change are both air and water temperatures, and changes in the timing and magnitude of storms, their runoff, and dry season streamflow. These changes are expected to be more significant in the southern part of the action area. These projections further highlight the importance of rescuing and relocating salmonids from drying streams within the CCC coho salmon ESU, NC steelhead DPS and CCC steelhead DPS.

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 CCC coho salmon, nor destroy or adversely modify its designated critical habitat.

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 NC steelhead DPS, nor destroy or adversely modify its designated critical habitat.

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, nor destroy or adversely modify its designated critical habitat.

2.9. Incidental Take Statement

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

The issuance of permit 26568 authorizes intentional take of endangered CCC coho salmon, threatened NC steelhead and threatened CCC steelhead that is related to the enhancement of these populations through coho salmon and steelhead rescue operations and research as described in the permit. NMFS does not anticipate any take of listed species that is incidental to the action. This biological opinion does not authorize any taking of a listed species under section 10(a) or immunize any actions from the prohibitions of section 9(a) of the ESA.

There isn't any incidental take because all the take contemplated in this document would be carried out under the permit that allows the permit holder to directly take the animals in question. The action is considered to be direct take, rather than incidental take, because in every case the actual purpose is to take the animals while carrying out a lawfully permitted activity. Thus, the take cannot be considered "incidental" under the definition given above.

Because the action would not cause any incidental take, we are not specifying an amount or extent of incidental take that would serve as a reinitiation trigger. Nonetheless, the amounts of direct take have been specified and analyzed in the effects section above (2.5). Those amounts—displayed in Table 1 and discussed in the effects analyses—constitute hard limits on both the amount and extent of take the permit holder would be allowed in a given year. Those amounts are also noted in the reinitiation clause just below because exceeding them would likely trigger the need to reinitiate consultation.

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 recommendation related to the proposed action considered in this biological opinion.

2.11. Reinitiation of Consultation

This concludes formal consultation for the issuance of ESA Section 10(a)(1)(A) Enhancement of Survival and Scientific Research Permit 26568 for endangered CCC coho salmon, threatened NC steelhead, and threatened CCC steelhead.

In the context of this opinion, there is no incidental take anticipated and the reinitiation trigger set out in § 402.16(a)(1) is not applicable. If any of the direct take amounts specified in this opinion's effects analysis (Section 2.5) are exceeded, reinitiation of formal consultation will be required because the regulatory reinitiation triggers set out in § 402.16(a)(2) and/or (a)(3) will have been met.

3. 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.

3.1. 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 National Marine Fisheries Service, California Department of Fish and Wildlife, and co-investigators named on the permit #26568 application. Other interested users could include local stakeholders. The document will be available within 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adhere to conventional standards for style.

3.2. 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.

3.3. Objectivity

Information Product Category: Natural Resource Plan

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

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion [*and EFH consultation, if applicable*] 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, if applicable*], and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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