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

May 5, 2022 **Refer to NMFS No:** WCRO-2021-02768

Darrell Cardiff
Senior Environmental Planner
California Department of Transportation, District 1
P.O. Box 3700
Eureka, California 95502

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Philo Greenwood Bridge Road over Navarro River Bridge Rehabilitation and Widening Project located near Montgomery Woods State Park in Mendocino County, California

Dear Mr. Cardiff:

Thank you for your letter of October 13, 2021, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Philo Greenwood Bridge Rehabilitation and Widening project. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402, 84 FR 45016). Also, thank you for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)) for this action.

The enclosed biological opinion is based on our review of the California Department of Transportation's (Caltrans) and the County of Mendocino (County) proposed project and describes NMFS' analysis of potential effects on endangered Central California Coast (CCC) coho salmon (*Oncorhynchus kisutch*), threatened California Coastal (CC) Chinook salmon (*Oncorhynchus tshawytscha*), and Northern California (NC) steelhead (*Oncorhynchus mykiss*) and designated critical habitat for these species in accordance with section 7 of the ESA. In the enclosed biological opinion, NMFS concludes the project is not likely to jeopardize the continued existence of CCC coho salmon, CC Chinook salmon, or NC steelhead; nor is it likely to adversely modify critical habitat for these species. However, NMFS anticipates that take of these species will occur and an incidental take statement with non-discretionary terms and conditions is included with the enclosed opinion.

NMFS has reviewed the proposed project for potential effects on EFH and determined that the proposed project would adversely affect EFH for Pacific Coast Salmon, which are managed under the Pacific Coast Salmon Fishery Management Plan. While the proposed action will result in adverse effects to EFH, the proposed project contains measures to minimize, mitigate, or otherwise offset the adverse effects; thus, no EFH Conservation Recommendations are included in this opinion.

Please contact Thomas Daugherty, North Central Coast Office in Santa Rosa, California at (707) 575-6050, or via email at Tom.Daugherty@noaa.gov if you have any questions concerning this section 7 and EFH consultation, or if you require additional information.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: Christa Unger, Caltrans Eureka CA, Christa.Unger@dot.ca.gov
e-file FRN#: 151422WCR2021SR00215

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

Philo Greenwood Bridge Rehabilitation and Widening project

NMFS Consultation Number: WCRO-2021-02768

Action Agency: California Department of Transportation

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?
CCC coho salmon	Endangered	Yes	No	Yes	No
CC Chinook salmon	Threatened	Yes	No	No	No
NC steelhead	Threatened	Yes	No	Yes	No

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

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

Issued By:

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Date: May 5, 2022

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1. INTRODUCTION

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

1.1. Background

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

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

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

1.2. Consultation History

On June 26, 2020, Caltrans requested technical assistance with the NMFS, with specific information regarding species listed under the ESA and California Endangered Species Act (CESA). NMFS responded to the request on July 19, 2020 with questions regarding fish relocation, sediment minimizations measures as well as other concerns. Caltrans submitted another proposed draft that addressed NMFS previous concerns and multiple meetings were conducted at the end of 2020 and during the first half of 2021. On October 13,2021, Caltrans initiated formal Section 7 consultation on behalf of the County for the proposed project. The NMFS reviewed the initiation request and accepted the consultation request on October 27, 2021.

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 (50 CFR 402.02). Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910). Under MSA, Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910).] We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not cause additional effects beyond those that are from the action as described below.

1.3.1 Bridge Construction

The County, under the purview of the Caltrans, proposes to rehabilitate and widen the existing single lane bridge in order to improve it to current design standards, increase public safety and improve transportation mobility. The County has the Philo-Greenwood bridge, located on Greenwood Road, near Philo, California for rehabilitation and widening under the federal-aid Highway Bridge Program administered by the Federal Highway Administration (FHWA) through Caltrans Local Assistance.

The proposed project will rehabilitate and widen this bridge with a structure capable of meeting all requirements of the Caltrans Local Programs Manual and Highway Bridge Program. The existing three-span open spandrel concrete arch bridge with 12 timber approach spans at Navarro River was built in 1951. The structure consists of 15 spans for a total length of approximately 350 feet including abutments. The timber approach spans are on the northern end of the existing bridge. The existing deck over the arch spans is bare concrete while the timber approach spans subfloor is covered with an asphalt concrete overlay. The bridge has a total deck width of 19 feet. The bridge rails consist of all timber elements. The approach spans are supported by timber bent caps on timber columns founded on reinforced concrete strip footings. The bridge abutments consist of reinforced concrete and appear to be founded on rock with spread footings.

The proposed project will widen and rehabilitate/retrofit the existing arch span and replace the timber approach spans with a new concrete approach structure. This will require a slight shift of the roadway alignment to the northwest of the existing bridge centerline to facilitate a bridge widening. This alignment will allow a lane of traffic to remain open during two stage bridge construction. The existing arch span will be widened to meet the capacity requirements of the roadway facility and rehabilitated/retrofitted to meet current design code requirements. The timber approach trestle will be replaced with a 3-span concrete approach structure. The approach and the one-lane bridge will be widened to carry two lanes of traffic to meet Caltrans and American Association of State Highway and Transportation Officials standards. Based on criteria from the Association's' A Policy on Geometric Design of Highways and Street 2011 (Green Book), the required traffic passage for this bridge will consist of two 11-foot lanes with two 5-foot shoulders for a total clear width of 32 feet, not including bridge railings.

Since there is no practical alternative detour route, Philo-Greenwood Road will need to remain open for the duration of construction. The project will not involve permanent modification or alteration of the Navarro River channel; however, a temporary access road from the staging area to a gravel work pad with a work platform spanning the river channel will be constructed downstream of the bridge to allow access by construction equipment. A temporary gravel fill work pad, with gravel fill abutments to support a work platform over the river channel, would be constructed and removed each season both for access of construction materials and equipment and to support falsework and forms for concrete work on main bridge structure. The required gravel fill work pad would be aligned under the bridge and may be up to 150 feet long (perpendicular to the river channel) and approximately 40 to 60 feet wide. Fill composed of clean, river-run gravel would be used to create the level work pad under the bridge. As part of this work pad, fill would be placed within the active river channel leaving, at least, a 20-foot wide clear, open channel between the fill on opposite banks to accommodate the typical range of summer river flows and not adversely affect hydraulic conditions for fish passage. Gravel fill within the river channel would be retained by K-rails or sheet piles vibrated into the riverbed with tie-backs to dead men anchors buried in the fill. Concrete blocks in or on the work pad fill would provide foundations on both banks for a temporary work platform to span across the river channel.

It is anticipated that excavators, dozers, cranes, pavers, dump trucks, concrete trucks, concrete pumps, excavation shoring systems, concrete formwork systems, and drilling equipment will be required to construct the new bridge. Construction is anticipated to be completed in two construction seasons. The first season would construct approximately half of the width of the final structure including part of the new approach structure and widening on the existing arch structure. The second season would construct the other half of the approach structure and complete rehabilitation of the existing arch structure. A concrete closure pour at the end of the second season will tie the two stages together into one final structure.

The bridge is expected to be founded on spread footings bearing on exposed rock and shallow bearing layers in the river terrace. Construction of these foundations will require earthwork excavation and backfill and temporary shoring systems such as braced sheet piling and tieback walls to allow placement of reinforced concrete foundation elements. Placement of the new arch foundations in the bedrock along the riverbanks will require a sheet pile coffer dam for the east abutment, dewatering system, temporary gravel fill work pad and a work platform across the river channel, rock excavation machinery, and rock anchors. The dewatering activities will be required to construct the eastern bridge foundation. The bridge arch foundation on the west bank can be constructed in the dry during typical summer flow levels and is not anticipated to need a coffer dam.

The complete width of the arch will be built in two phases (partial widths) to accommodate traffic during construction over two construction seasons. Sheet pile coffer dams will be installed using a vibratory pile driver to isolate the temporary gravel work pad and bridge crossing from the main river channel. These areas will require dewatering and fish relocation of the channel approximately 60 feet by 30 feet along the eastside of the river and 150 feet by 60 feet on the westside of the channel (a total area of approximately 10,800 square feet). The dewatered area will be filled with clean river-run gravel, and the area will be used for the temporary bridge crossing, partial demolition of the existing bridge and construction of the foundation for the new/widened bridge. It is anticipated that these activities could take up to 10 weeks in the dewatered area. Coffer dams and dewatering may be accomplished using structural means such as water bladders, precast concrete elements covered in plastic sheeting or sheet piles filled with clean gravel. Fish will be salvaged or otherwise excluded from the area to be dewatered before water is pumped to a settling basin created on the floodplain/gravel bar, where sediment will settle out and water can percolate through the gravel bar back to the river channel. The contractor will be required to remove coffer dam and gravel fill materials at the completion of seasonal construction activities.

Construction of the superstructure for both the new arch and new approach bridge will require a temporary falsework system, comprised of timber and steel beams and posts to support concrete formwork and wet concrete until it hardens to become the permanent bridge structure. Long spans of concrete formwork over the river channel and floodplain will require temporary falsework to be supported on the gravel fill work pad and work platform beneath the existing bridge. Falsework may be supported on precast elements, timber mats, or clean gravel confined within metal forms/elements. All temporary construction systems and fill materials within the floodplain will be removed upon completion of bridge construction at the end of each construction season. Removal of the existing timber approach structure and portions of existing concrete arch will occur throughout both seasons as needed to make room for new bridge elements. Reinforcement and shoring of portions of the existing bridge will also be required to stabilize them for traffic during construction of the adjacent new bridge elements, which would all occur on the gravel fill work pads and work platform used to span the river channel.

1.3.2 Avoidance and Minimization Measures

Avoidance and Minimization Measures (AMMs) are proposed to minimize potential effects on federally listed species and other biological resources as proposed in the Caltrans biological assessment (BA) dated September 2021 (Caltrans 2021. The project has been designed to avoid and minimize impacts to the Navarro River and the surrounding habitat by proposing to build the replacement bridge in the same footprint as the existing bridge and by not placing any permanent bridge structures in the creek channel. The proposed avoidance and minimization measures (AMMs) focus on minimizing the potential for incidental take of salmonids in the project area, sediment delivery, toxic material to the stream reach and protecting habitat features of the active channel bed and banks.

Due to the seasonal abundance of listed fish species in the Navarro River, a seasonal work window for in-water work activities from June 15–October 15 is proposed to minimize direct injury or mortality of CCC coho salmon, CC Chinook salmon, and NC steelhead. Prior to any construction activities occurring within the wetted river channel fish will be relocated and or excluded from work areas. Fish exclusion and removal may require installation of block nets, turbidity curtains, and/or coffer dam enclosures and dewatering during fish collection in enclosed areas prior to any construction work in the river channel. Measures are proposed for the proper handling and relocation of ESA listed salmonids and other species collected. Qualified fisheries biologists will direct the dewatering activities and conduct the capture and relocation of aquatic species. Caltrans proposed a detailed fish relocation plan that outlines measures to minimize and avoid effects to salmonids during these activities. Measures are provided to reduce impacts during dewatering, follow approved capture methods, and minimize handling and release impacts to salmonids (Caltrans 2021).

AMMs for stormwater runoff and sediment transport include a Stormwater Pollution Prevention Plan (SWPPP) and site-specific spill prevention plan will be implemented by the County to maintain water quality within the Navarro River. These plans include measures such as isolating on-site earthen stockpiles with a silt fence, filter fabric, and/or straw bales/fiber rolls. Silt fence and/or fiber rolls will also be placed at bridge abutments, new abutment excavation areas, and any other locations when work could result in loose sediment possibly entering the stream. The silt fence/fiber rolls would be maintained and kept in place for the duration of the project. Any sediment or debris captured by the fence/rolls will be removed before the fence/rolls are removed. Additional erosion, sediment materials will be stockpiled to implement best management practices (BMPs) as necessary, between work areas and the adjacent waterway to avoid the potential for sediment latent runoff to enter the stream.

The County proposed to implement construction specifications that include measures to reduce potential impacts to vegetation and aquatic habitat resources in the action area associated with accidental spills of pollutants (e.g., fuel, oil, asphalt, and grease). All construction will be completed according to the most recent Caltrans Site Best Management Practices Manual to protect water quality. A site-specific spill prevention plan shall be prepared prior to construction and implemented throughout construction to address potentially hazardous materials. The plan shall include the proper handling and storage of all potentially hazardous materials, as well as the proper procedures for cleaning up and reporting any spills. If necessary, containment berms shall be constructed to prevent spilled materials from reaching surface water features.

Proposed AMMs for protection of riparian habitat include minimization of the disturbance area, exclusion fencing to protect riparian vegetation, replanting vegetation and restoring disturbed areas at a 3:1 ratio. A complete list of the AMMs can be found in the Caltrans BA (Caltrans 2021).

1.3.3 Conformance with California Endangered Species Act

A Section 2080.1 consistency determination for CCC coho salmon from the California Department of Fish and Wildlife (CDFW) will be requested for this project. In order for CDFW to issue a consistency determination, Caltrans proposes to provide security, in compliance with the Master Funding Agreement entered into by the CDFW and Caltrans on September 3, 2021, to ensure that it has adequate funding to complete the mitigation measures.

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

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

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

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

2.2. Rangewide Status of the Species and Critical Habitat

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

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

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

Threatened CC Chinook salmon (*O. tshawytscha*) ESU
Listing determination (70 FR 37160; June 28, 2005);

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

Species of CC Chinook salmon are included in this biological opinion because of their presence in the Navarro River watershed. Critical habitat as designated in FR 52488; September 2, 2005, is not included in this biological opinion because the Navarro River Hydrologic Sub-Area (HSA) 111350 was excluded from critical habitat due to the revised economic data for this ESU and the final ESA section 4(b)(2) analysis. NMFS excluded all occupied habitat in the HSA proposed for designation (FR 52488; September 2, 2005), therefore, CC Chinook critical habitat will not be further analyzed in the biological opinion.

2.2.1 General Life History of Listed Species

NC Steelhead

Steelhead are the anadromous form of O. mykiss, spawning in freshwater and migrating to marine environments to grow and mature. Steelhead have a complex life history that requires successful transition between life stages across a range of freshwater and marine habitats (i.e., egg-to-fry emergence, juvenile rearing, smolt outmigration, ocean survival, and upstream migration and spawning). Steelhead exhibit a high degree of life history plasticity (Shapovalov and Taft 1954; Thrower et al. 2004; Satterthwaite et al. 2009). The occurrence and timing of these transitions are highly variable and generally driven by environmental conditions and resource availability (Satterthwaite et al. 2009; Sogard et al. 2012).

Steelhead are generally divided into two ecotypes based on timing and state of maturity when returning to freshwater: summer-run and winter-run. Summer-run steelhead return to natal streams in spring and early summer while they are still sexually immature and spend several months maturing before spawning in January and February (Nielson and Fountain 2006). Winter-run steelhead enter natal streams as mature adults with well-developed gonads. They typically immigrate between December and April and spawn shortly after reaching spawning grounds (Shapovalov and Taft 1954; Moyle et al. 2008).

Adult steelhead spawn in gravel substrates with low sedimentation and suitable flow velocities. Females lay eggs in redds, where they are quickly fertilized by males and covered. Egg survival depends on oxygenated water circulating through the gravel, facilitating gas exchange and waste removal. Adults usually select spawning sites in pool-riffle transition areas of streams with gravel cobble substrates between 0.6 to 10.2 centimeters (cm) in diameter and flow velocities between 40 - 91cm per second (Smith 1973; Bjornn and Reiser 1991). Eggs incubate in redds for approximately 25 to 35 days depending on water temperature (Shapovalov and Taft 1954). Incubation time depends on water temperature, with warmer temperatures leading to lower incubation periods due to increased metabolic rates. Eggs hatch as alevin and remain buried in redds for an additional two to three weeks until yolk-sac absorption is complete (Shapovalov and Taft 1954). Optimal conditions for embryonic development include water temperatures between 6 and 10°C, dissolved oxygen near saturation, and fine sediments less than 5% of substrate by volume (Bjornn and Reiser 1991; USEPA 2001).

Upon emerging from redds, juvenile steelhead occupy edgewater habitats where flow velocity is lower and cover aids in predator avoidance. Rearing juveniles feed on a variety of aquatic and terrestrial invertebrates. As they grow, juveniles move into deeper pool and riffle habitats where they continue to feed on invertebrates and have been observed feeding on younger juveniles (Chapman and Bjornn 1969; Everest and Chapman 1972). Juveniles can spend up to four years rearing in freshwater before migrating to the ocean as smolts, although they typically only spend one to two years in natal streams (Shapovalov and Taft 1954; Busby et al. 1996). Successful rearing depends on stream temperatures, flow velocities, and habitat availability. Preferred water temperature ranges from 12 to 19°C and sustained temperatures above 25°C are generally considered lethal (Smith and Li 1983; Busby et al. 1996). In Central California streams, juvenile steelhead are able to survive peak daily stream temperatures above 25°C for short periods when food is abundant (Smith and Li 1983). Response to stream temperatures can vary depending on the conditions to which individuals are acclimated, however, consistent exposure to high stream temperatures results in slower growth due to elevated metabolic rates and lower survival rates overall (Hokanson et al. 1977; Busby et al. 1996).

Juveniles undergo behavioral, morphological, and physiological changes in preparation for ocean entry, collectively called smoltification. Juveniles begin smoltification in freshwater and the process continues throughout downstream migration with some smolts using estuaries for further acclimation to saltwater prior to ocean entry (Reiser and Bjornn 1979). Juveniles typically will not smolt until reaching a minimum size of 160 mm (Burgner et al. 1992). Smoltification is cued by increasing photoperiod. Stream temperatures influence the rate of smoltification, with warmer temperatures leading to more rapid transition. Downstream migration of smolts typically occurs from April to June when temperature and stream flows increase. Preferred temperature for smoltification and outmigration is between 10 and 17°C with temperatures below 15°C considered optimal (Hokanson et al. 1977; Wurtsbaugh and Davis 1977; Zedonis and Newcomb 1997; Myrick and Cech 2005). In coastal systems with seasonal lagoons, smolts may take advantage of higher growth potential in productive lagoon habitats before ocean entry (Osterback et al. 2018).

Adult steelhead are known to be highly migratory during ocean residency but little is known of their habitat use and movements. They have been observed moving north and south along the continental shelf, presumably to areas of high productivity to feed (Barnhart 1986). Adults will typically spend one to two years in the ocean, feeding and growing in preparation for spawning (Shapovalov and Taft 1954; Busby et al. 1996). Upstream migration typically begins once winter rains commence and stream flows increase. For coastal systems with seasonal freshwater lagoons, winter storms are required to breech the sandbars and allow access to upstream spawning sites. Steelhead are iteroparous, meaning they can return to spawn multiple times. Adult steelhead may spawn up to four times in their lifetime, although spawning runs predominantly consist of first-time spawners (~59%) (Shapovalov and Taft 1954). The maximum life span of steelhead is estimated to be nine years (Moyle 2002).

CC Chinook salmon

Chinook salmon follow the typical cycle of Pacific salmon, hatching in freshwater, migrating to the ocean, and returning to freshwater to spawn and die. Diversity within this life cycle exists, however, in the time spent at each stage. Chinook salmon are classified into two groups, ocean-type and stream-type, based on the period of freshwater residence (Healey 1991; Meyers et al. 1998). Fall or late fall-run fish enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of rivers, and spawn within a few weeks of freshwater entry. Juveniles emigrate to estuarine or marine environments shortly after emergence from the red (Healey 1991). Stream-type fish are typically winter or spring-run fish that have a protracted adult freshwater residency, sometimes spawning several months after entering freshwater. Progeny of stream-type fish frequently spend one or more years in freshwater before emigrating. After emigrating, Chinook salmon remain in the ocean for two to five years and tend to stay in the coastal waters off California and Oregon (Healey 1991). Chinook salmon are also characterized by the timing of adult returns to freshwater for spawning, with the most common types referred to as fall-run and spring-run fish.

Chinook generally remain in the ocean for two to five years (Myers et al. 1998). Some Chinook salmon return from the ocean to spawn one or more years early. These early maturing fish are referred to as jacks (males) and jills (females). The low flows, high water temperatures, and sand bars that develop in smaller coastal rivers of coastal California during the summer months favor an ocean-type life history or fall-run (Myers et al. 1998). With this life history, adults enter freshwater between August and January (Fukushima and Lesh 1998; Chase et al. 2007) and smolts typically outmigrate as sub-yearlings between April and July (Myers et al. 1998). Fall-run fish typically enter freshwater with fully developed gonads, move rapidly to their spawning areas on the mainstem or lower tributaries of mainstem rivers (elevations of 200 to 1,000 feet), and spawn within a few weeks of freshwater entry. In contrast, spring-run fish inhabit large river systems with high elevation tributaries fed by melting snowpack. Spring-run fish enter river systems during peak snowmelt, between April and August, with undeveloped gonads that mature over the summer. These fish migrate when high flows facilitate passage into cold, headwater tributaries where the fish hold until they spawn later that fall.

Spawning generally occurs in swift, relatively shallow riffles or along the edges of fast runs at depths greater than 24 cm. Adult female Chinook salmon prepare redds in stream areas with suitable gravel composition, water depth, and velocity. Individual females spawn for five to fourteen days and will guard or defend their redds for two to four weeks before dying (Beauchamp et al. 1983). The number of eggs a female produces generally ranges from 2,000–17,000 (Groot and Margolis 1991) and is not directly correlated to fish size (Hassler 1987; Moyle 2002). Optimal spawning temperatures range between 5.6 and 13.9°C. Redds vary widely in size and location within the river. Preferred spawning substrate is clean, loose gravel, mostly sized between 1.3 and 10.2 cm, with fine sediment not exceeding 10 percent. Chinook salmon eggs incubate for 90 to 150 days depending on water temperature (Allen and Hassler 1986). Successful incubation depends on several factors, including dissolved oxygen levels, temperature, substrate size, amount of fine sediment, and water velocity. Maximum survival of incubating eggs and pre-emergent fry occurs at water temperatures between 5.6 and 13.3°C with an optimal temperature of 11.1°C. Alevins remain in the gravel for a month or longer (about four to six weeks) until they emerge as fry (Beauchamp et al. 1983; Moyle 2002). Fry emergence begins in December and continues into mid-April (Leidy and Leidy 1984). After emergence, Chinook salmon fry seek out areas behind fallen trees, back eddies, undercut banks, and other cover (Everest and Chapman 1972). Cover, in the form of rocks, submerged aquatic vegetation, logs, riparian vegetation, and undercut banks provides food, shade, and protects juveniles from predation. As they grow larger, juveniles move away from stream margins and begin to use deeper water areas with slightly faster water velocities, but continue to use available cover to minimize the risk of predation and reduce energy expenditure (Chapman and Bjornn 1969; Everest and Chapman 1972).

CCC Coho salmon

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

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

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

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

2.2.2 Status of Species and Critical Habitat

In this biological opinion, NMFS assesses four population viability parameters to help us understand the status of each species and their ability to survive and recover. These population viability parameters are abundance, population growth rate, spatial structure, and diversity (McElhaney et al. 2000). While there is insufficient information to evaluate these population viability parameters in a thorough quantitative sense, NMFS has used existing information, including the NOAA Fisheries' Recovery Plan for the Evolutionary Significant Unit of Central California Coast Coho salmon (NMFS 2012) and NOAA Fisheries' Coastal Multispecies Recovery Plan (NMFS 2016a), to determine the general condition of each population and factors responsible for the current status of each DPS or ESU.

We use these population viability parameters as surrogates for numbers, reproduction, and distribution, the criteria found within the regulatory definition of jeopardy (50 CFR 402.20). For example, the first three parameters are used as surrogates for numbers, reproduction, and distribution. We relate the fourth parameter, diversity, to all three regulatory criteria. Numbers, reproduction, and distribution are all affected when genetic or life history variability is lost or constrained resulting in reduced population resilience to environmental variation at local or landscape-level scales.

NC Steelhead

Historically, the NC steelhead DPS was comprised of 41 independent populations (19 functionally and 22 potentially independent) of winter run steelhead and 10 functionally independent populations of summer run steelhead (Bjorkstedt et al. 2005). Based on the limited data available (dam counts of portions of stocks in several rivers), NMFS' initial status review of NC steelhead (Busby et al. 1996) determined that population abundance was very low relative to historical estimates (1930s and 1960s dam counts), and recent trends were downward in most stocks. Overall, population numbers are severely reduced from pre-1960s levels, when approximately 198,000 adult steelhead migrated upstream to spawn in the major rivers supporting this Distinct Population Segment (DPS) (Busby et al. 1996, 65 FR 36074).

NMFS status reviews reached the same conclusion, and noted the poor amount of data available, especially for winter run steelhead (NMFS 1997, Good et al. 2005). The information available suggested that the population growth rate was adverse. It is known that dams on the Mad River and Eel River block large amounts of habitat historically used by NC steelhead (Busby et al. 1996). 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. Historical hatchery practices at the Mad River hatchery are of particular concern, and included out-planting of non-native Mad River hatchery fish to other streams in the DPS and the production of non-native summer steelhead (65 FR 36074). The conclusion of an earlier status review by (Good et al. 2005) echoes that of previous reviews. Abundance and productivity in this DPS are of most concern, relative to NC steelhead spatial structure (distribution on the landscape) and diversity (level of genetic introgression).

NMFS evaluated the listing status of NC steelhead and proposed maintaining the threatened listing determination (71 FR 834) in 2006. A subsequent status review by Williams et al. (2011) reported a mixture of patterns in population trend information, with more populations showing declines than increases. Although little information was available to assess the status for most population in the NC steelhead DPS, overall Williams et al. (2011) found little evidence to suggest a change in status compared to the last status review by Good et al. (2005).

The most recent status review (Seghesio and Wilson 2016) found that information on steelhead populations in the NC steelhead DPS has improved considerably in the past 5 years, due to implementation of the CMP across a significant portion of the DPS. Nevertheless, significant gaps in information still remain, particularly in the Lower Interior and North Mountain Interior diversity strata, where there is very little information from which to assess status. Overall, the available data for winter-run populations— predominately in the North Coastal, North-Central Coastal, and Central Coastal strata— indicate that all populations are well below viability targets, most being between 5% and 13% of these goals. For the two Mendocino Coast populations with the longest time series, Pudding Creek and Noyo River, the 13-year trends have been adverse and neutral, respectively (Spence 2016). However, the short-term (6-year) trend has been generally beneficial for all independent populations in the North-Central Coastal and Central Coastal strata, including the Noyo River and Pudding Creek (Spence 2016). Data from Van Arsdale Station likewise suggests that, although the long-term trend has been adverse, run sizes of natural-origin steelhead have stabilized or are increasing (Spence 2016). Thus, we have no strong evidence to indicate conditions for winter-run populations in the DPS have worsened appreciably since the status review by (Seghesio and Wilson 2016).

Most populations for which there are population estimates available remain well below viability targets; however, the short-term increases observed for many populations, despite the occurrence of a prolonged drought in northern California, suggests this DPS is not at immediate risk of extinction (Seghesio and Wilson 2016).

Chinook Salmon

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

Data on CC Chinook abundance, both historical and current, is sparse and of varying quality (Bjorkstedt et al. 2005). Estimates of absolute abundance are not available for populations in this ESU (Myers et al. 1998). In 1965, CDFG (1965) estimated escapement for this ESU at over 76,000. Most were in the Eel River (55,500), with smaller populations in Redwood Creek (5,000), Mad River (5,000), Mattole River (5,000), Russian River (500) and several smaller streams in Humboldt County (Myers et al. 1998). More recent information from Sonoma Water monitoring at their Mirabel fish ladder from 2000 to 2014 suggests moderate to good abundance of Russian River Chinook salmon with 1,113 to 6,696 adult fish reported (Martini-Lamb and Manning 2015).

CC Chinook salmon populations remain widely distributed throughout much of the ESU. Notable exceptions include the area between the Navarro River and Russian River and the area between the Mattole and Ten Mile River populations (Lost Coast area). The lack of Chinook salmon populations both north and south of the Russian River (the Russian River is at the southern end of the species' range) makes it one of the most isolated populations in the ESU. Myers et al. (1998) reports no viable populations of Chinook salmon south of San Francisco, California.

Because of their prized status in the sport and commercial fishing industries, CC Chinook salmon have been the subject of many artificial production efforts, including out-of-basin and out-of-ESU stock transfers (Bjorkstedt et al. 2005). It is, therefore, likely that CC Chinook salmon genetic diversity has been adversely affected despite the relatively wide population distribution within the ESU. An apparent loss of the spring-run Chinook life history in the Eel River Basin and elsewhere in the ESU also indicates risks to the diversity of the ESU.

Data from the 2009 adult CC Chinook salmon return counts and estimates indicated a further decline in returning adults across the range of CC Chinook salmon on the coast of California (Jahn, NMFS, personal communication 2010). Ocean conditions are suspected as the principal short-term cause because of the wide geographic range of declines (SWFSC 2008). However, the number of adult CC Chinook salmon returns in the Russian River Watershed increased substantially in 2010/2011 compared to 2008/09 and 2009/10 returns. Increases in adult Chinook salmon returns during 2010/2011 have been observed in the Central Valley populations as well.

The most recent status review summary by Seghesio and Wilson (2016) reports that the new information available since the last status review (Williams et al. 2011) does not appear to suggest there has been a change in extinction risk for this ESU. Williams et al. (2011) found that the loss of representation from one diversity stratum, the loss of the spring-run history type in two diversity substrata, and the diminished connectivity between populations in the northern and southern half of the ESU pose a concern regarding viability for this ESU. Based on consideration of this updated information, Williams et al. (2011) concluded the extinction risk of the CC Chinook salmon ESU has not changed since the last status review which affirmed no change to the determination that the CC Chinook salmon ESU is a threatened species, as previously listed (NMFS 2011), 76 FR 50447). NMFS' previous status review (Williams et al. 2011) discussed the fact that populations that lie between the lower boundary of the Central Valley Fall Chinook salmon ESU (Carquinez Straits) and the southern boundary of CC Chinook salmon ESU (Russian River) were not included in either ESU, despite the fact that Chinook salmon had been reported in several basins. Available genetic evidence indicated fish from the Guadalupe and Napa rivers in San Francisco and San Pablo Bays had close affinity with Central Valley Fall Chinook salmon (Garza et al., unpublished data B; Garza and Pearse 2008, as cited in Williams et al. 2011), and it was recommended that fish from these two watersheds be included in the Central Valley Fall Chinook ESU. Evidence for fish in Lagunitas Creek was equivocal, with 17 samples assigned almost equally between CC Chinook salmon and Central Valley Fall Chinook salmon. The biological review team in 2011 from the Southwest fisheries Science Center (SWFSC) tentatively concluded that Lagunitas Creek Chinook salmon should be considered part of the CC Chinook salmon ESU pending additional data (Williams et al. 2011). NMFS subsequently indicated that a boundary change was under consideration (76 FR 50447); however, no action has been taken to date. Currently there is no new genetic information that helps resolve this issue (Seghesio and Wilson 2016). This most recent status review of this CC Chinook salmon suggests that spatial gaps between extant populations along the Mendocino coast are not as extensive as previously believed (Seghesio and Wilson 2016). As stated above, this information has not changed the determination that the extinction risk for this ESU remains as threatened (Seghesio and Wilson 2016).

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

Brown et al. (1994) estimated that annual spawning numbers of coho salmon in California ranged between 200,000 and 500,000 fish in the 1940's, which declined to about 100,000 fish by the 1960's, followed by a further decline to about 31,000 fish by 1991. 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. In the next decade, abundance estimates dropped to approximately 5,500 adults (NMFS 2012). Genetic research in progress by both the SWFSC and the Bodega Marine Laboratory documented reduced genetic diversity within CCC coho salmon subpopulations (Bjorkstedt et al.

2005). The influence of hatchery fish on wild stocks has also contributed to the poor diversity through outbreeding depression and disease.

All past status reviews (NMFS 2003, NMFS 2005a, Williams et al. 2011, Rogers et al. 2016) indicated that the CCC coho salmon were likely continuing to decline in number. CCC coho salmon have also experienced acute range restriction and fragmentation. Williams et al. (2011), in a SWFSC status update, noted that for all available time series, population trends were downward with particularly poor adult returns from 2006 to 2010. In addition, many independent populations were well below low-risk abundance targets and several were either extinct or below the high-risk dispensation thresholds that were identified by Spence et al. (2008). It appears that none of the five diversity strata defined by Bjorkstedt et al. (2005) currently support viable populations based on criteria established by Spence et al (2008). However, information on population status and trends for CCC Coho Salmon has improved considerably since the 2011 status review due to recent implementation of the Coastal Monitoring Program (CMP) across significant portions of the ESU. Within the Lost Coast – Navarro Point stratum, current population sizes range from 4% to 12% of proposed recovery targets, with two populations (Albion River and Big River, respectively) at or below their high-risk depensation thresholds. Most independent populations show beneficial but non-significant population trends; however, the trend in the Noyo River has been beneficial for the past 5-6 years. Dependent populations within the stratum have declined significantly since 2011, with average adult returns ranging from 417 in Pudding Creek (42 percent of the recovery target) to no adult returns observed within Usal and Cottaneva creeks (Rogers et al. 2016).
Similar results were obtained immediately south within the Navarro Point – Gualala Point diversity stratum, where two of the three largest independent populations, the Navarro and Garcia rivers, have averaged 257 and 46 adult returns, respectively, during the past six years (both populations are below their high-risk depensation threshold). Data from the three dependent populations within the stratum (Brush, Greenwood and Elk creeks) suggest little to no adult coho salmon escapement since 2011.

In the Russian River and Lagunitas Creek watersheds, which are the two largest within the Central Coast strata, recent coho salmon population trends suggest limited improvement, although both populations remain well below recovery targets. Likewise, most dependent populations within the strata remain at very low levels, although excess broodstock adults from the Russian River and Olema Creek were recently stocked into Salmon Creek and the subsequent capture of juvenile fish indicates successful reproduction occurred. Finally, recent sampling within Pescadero Creek and San Lorenzo River, the only two independent populations within the Santa Cruz Mountains strata, suggest coho salmon have likely been extirpated within both basins. A bright spot appears to be the recent improvement in abundance and spatial distribution noted within the strata's dependent populations; Scott Creek experienced the largest coho salmon run in a decade during 2014/15, and researchers recently detected juvenile coho salmon within four dependent watersheds where they were previously thought to be extirpated (San Vincente, Waddell, Soquel and Laguna creeks).

Summarizing the information to inform the larger ESU, most independent CCC coho salmon populations remain at critically low levels. Data suggests some populations show a slight beneficial trend in annual escapement, but the improvement is not statistically significant.

Overall, all CCC coho salmon populations remain, at best, a slight fraction of their recovery target levels, and, aside from the Santa Cruz Mountains strata, the continued extirpation of dependent populations continues to threaten the ESU's future survival and recovery. Available data from the few remaining independent populations shows continuing declines and many independent populations that supported the species overall numbers and geographic distributions have been extirpated. This suggests that populations that historically provided support to dependent populations via immigration have not been able to provide enough immigrants for many dependent populations for several decades. The near-term (10 - 20 years) viability of many of the extant independent CCC coho salmon populations is of serious concern. These populations may not have sufficient abundance levels to survive additional natural or human caused environmental change. The 2016 status review for this species (Rogers et al. 2016) summarized the best available information on the biological status of the ESU and the threats facing the ESU and found that it continues to remain endangered.

The substantial decline in the Russian River coho salmon abundance led to the formation of the Russian River Coho Salmon Captive Broodstock Program in 2001. Under this program, offspring of wild captive-reared coho salmon are released as juveniles into tributaries within their historic range with the expectation that some of them will return as adults to naturally reproduce. Juvenile coho salmon and coho salmon smolts have been released into several tributaries within the lower Russian River and Dry Creek watersheds. Estimated adult abundance for coho salmon has improved in these watersheds, which has ranged from 219 to 484 fish for spawning years 2104/15 to 2017/18 (Bauer et al. 2018).

The NMFS's recovery plan (NMFS 2012) for the CCC coho salmon ESU identified the major threats to population recovery. These major threats include roads, water diversions and impoundments; residential and commercial development; and severe weather. The impacts of these major threats are described in the status of critical habitat section.

2.3 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 and biological features, or 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.

PBFs for CCC coho salmon and NC 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.

For CCC coho salmon and NC steelhead) 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).

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

2.4 Additional Threats to Salmonids and Critical Habitat

Global climate change presents an additional potential threat to salmonids and their critical habitats. 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 Mountains has declined (Kadir et al. 2013). However, total annual precipitation amounts have shown no discernable change (Kadir et al. 2013). Listed salmonids may have already experienced some detrimental impacts from climate change. NMFS believes the impacts on listed salmonids to date are likely fairly minor because natural, and local, climate factors likely still drive most of the climatic conditions steelhead experience, and many of these factors have much less influence on steelhead abundance and distribution than human disturbance across the landscape.

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

For Northern California, most models project heavier and warmer precipitation. Extreme wet and dry periods are projected, increasing the risk of both flooding and droughts (OEHHA 2018). Estimates show that snowmelt contribution to runoff in the Sacramento/San Joaquin Delta may decrease by about 20 percent per decade over the next century (Cloern et al. 2011). Many of these changes are likely to further degrade listed salmonid habitat by, for example, reducing stream flows during the summer and raising summer water temperatures. Estuaries may also experience changes detrimental to salmonids. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia et al. 2002, Ruggiero et al. 2010). In marine environments, ecosystems and habitats important to juvenile and adult salmonids are likely to experience changes in temperatures, circulation, water chemistry, and food supplies (Brewer and Barry 2008; Feely 2004; Osgood 2008; Turley 2008; Abdul-Aziz et al. 2011; Doney et al. 2012). The projections described above are for the mid to late 21st Century. In shorter 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).

2.3. Action Area

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

The action area also includes a stream reach along the Navarro River at the location of the bridge rehabilitation and an area on the east and west side of the river that encompasses 12.55 acres of area and 500 lineal feet of river reach. This area includes the expansion on the roadway approaches, areas along the creek where the new abutments will be placed, and the slightly widened bridge footprint. The action area extends along a section of stream channel downstream from the bridge to conservatively account for any potential transient turbidity and sedimentation downstream of instream work areas. The portion of the action area where direct effects to salmonids is proposed during dewatering and fish relocation is an 1,800-square foot area on the east side of the river channel. Construction areas where work pads, a sediment retention basin, dewatered area, riparian removal and access roads are all within the 12.55-acre footprint of the project.

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 proposed project is located on the upper mainstem of the Navarro River approximately 4 miles downstream of the confluence of three major tributaries, Rancheria Creek, Indian Creek, and Anderson Creek. This area is known as Anderson Valley, which has the towns of Philo and Boonville as its small population areas. Historically, timber harvest was the primary land use, with harvest activities beginning in the mid-1800s and a second logging boom occurring from the 1930s to the early 1950s. Industrial and private timberlands have been harvested consistently since the 1950s, with a spike from the late 1980s to about 1998. Agricultural and grazing development began as early as the 1850s in Anderson Valley, with apple production and sheep grazing in the watershed (NMFS 2016a). Past timber harvest, agricultural, and grazing impacts have resulted in the establishment of a TMDL for impaired temperature and sediment conditions by the EPA in 2000. Water diversion is an issue in this basin due to agricultural diversions; the SWRCB (1998) concluded the Navarro should be listed as fully appropriated between April 1 and December 14. The SWRCB Division of Water Rights subsequently formally recognized the Navarro as fully allocated during the summer (NMFS 2016a).

The Navarro River steelhead population is an Essential population which are those expected to achieve a high probability of persisting over long periods of time (low risk of extinction). This population is required to achieve low risk of extinction for recovery of the Central Coastal Diversity Stratum of the NC steelhead Distinct population Segment (NMFS 2016a). Recovery for this population will occur if the watershed reaches an average of 7,800 adult spawning fish over a 12-year period. Currently, the population is low, with adult populations averaging from about 500 to 800 steelhead annually (Gallagher and Wright 2012, Holloway et al. 2015). The project stream reach is used by multiple age-classes of steelhead from adult fish that migrate or spawn in the area, smolts that migrate through this area to the estuary, embryos in redds, or various age classes of juveniles that reside throughout the year in the mainstem river.

Coho salmon and Chinook salmon are far less abundant in the action area and in the mainstem Navarro River area and tributaries of the Anderson Valley. Small numbers of adult coho may migrate through the action area during the fall and winter to spawn in upstream tributaries and fry and smolts may emigrate during the spring. Coho salmon escapement estimates for the Navarro River in the 2014/2015 season were, 423 (95% confidence interval (CI): 189-908) (Holloway et al. 2015 as cited in Caltrans 2021).

CC Chinook salmon are the least abundant species in the action area, with few individuals being observed over the past few decades. The Navarro River, in reaches downstream and upstream of the action area are likely to provide suitable spawning and juvenile rearing habitat for CC Chinook salmon, although occurrences are uncommon and are believed to only occur sporadically. Chinook salmon redd surveys during 2011 in three reaches of the Navarro River yielded 4 redds for an estimated adult escapement of 10 adult Chinook salmon (95% CI: 0-173) (Gallagher and Wright 2012 as cited in Caltrans 2021).

The project stream reach is within designated critical habitat for CCC coho salmon and NC steelhead (70 FR 52488, September 2, 2005). Generally, the majority of streams in the watershed that are of appropriate gradient (<10 percent slope) and have surface or intermittent flow will have steelhead present throughout the year. NMFS (2016a) evaluated habitat quality for the recovery of steelhead in this watershed and found that stream temperatures are marginal in many of the less forested reaches of Anderson Valley, large woody debris are lacking, and spawning gravels are generally in poor condition (NMFS 2016a). Stream flow within the Anderson Valley is limited for steelhead rearing with direct and groundwater diversions as a threat to habitat availability.

Given that streamflow and temperatures for salmonids the action area is currently stressed during the hot summer months, we also rely on information from section 2.2.4 with respect to the broader climatic variables influencing the current condition of habitat in the action area. Variables such as air temperature, wind patterns, and precipitation are likely influencing localized environmental conditions, such as water temperature, stream flow, and food availability. These local environmental conditions can affect the biology of listed species and the functioning of critical habitat and its value for conservation. The combination of climate change effects and effects of past and current human activities on local environmental conditions further reduce the current habitat suitability in the Navarro River and its tributaries.

2.4 Previous Section 7 Consultations in the Action Area

No previous Section 7 consultations have been conducted in the action area for this project. Section 7 consultations have been completed for bank protection projects in stream reaches located upstream of the project area on Indian Creek and Robinson Creek within the last 10 years.

2.5. Effects of the Action

Under the ESA, “effects of the action” are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action (see 50 CFR 402.02). A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered the factors set forth in 50 CFR 402.17(a) and (b).

Construction activities, both during and post-project completion, associated with the proposed project may affect NC steelhead, CCC coho salmon and CC Chinook salmon and critical habitat designated for NC steelhead and CCC coho salmon. The following effects may result from construction activities: unintentional direct injury or mortality during fish collection, relocations, and dewatering activities; temporary loss of benthic habitat; reductions in riparian vegetation and cover, and temporary impacts to channel bed morphology and water quality.

2.5.2 Vegetation Removal and Site Disturbance

Minor vegetation and removal will be conducted to make room for staging materials and equipment. Tree removal and vegetation trimming could cause impacts to shade and reduction to potential wood recruitment to the stream channel. The project will result in temporary reductions in riparian vegetation during tree removal for construction access and staging, and for construction of the new bridge. Riparian vegetation helps maintain stream habitat conditions necessary for salmonid growth, survival, and reproduction. Riparian vegetation disturbance and removal can degrade these ecosystem functions and impair stream habitat. Removal of riparian vegetation increases stream exposure to solar radiation, leading to increases in stream temperature (Poole and Berman 2001).

A total of 0.10 acres of riparian and wetland habitat will be impacted by the proposed project. The loss of the larger riparian trees will result in minor changes in shade, which may result in some increased solar radiation to the wetted channel. A slight reduction in riparian shade within the action area is expected to be minor and will likely be mitigated within 2 to 5 years with the proposed revegetation of the project area. The removal of a few larger trees is expected to reduce the potential for LWD recruitment, which may reduce habitat quality in the action area. Overall reduction in habitat quality is expected to be minor with loss of one or two trees that may be recruited to the channel periodically that may reduce cover and pool development. This minor reduction in habitat quality may cause individual fish to seek alternative areas where suitable areas exist nearby, such that the reduction in tree recruitment is not expected to reduce or limit the survival of individual salmon or steelhead utilizing the action area. AMMs applied during implementation, and site restoration are expected to substantially reduce the impact of riparian vegetation removal on salmonids and their habitat. The project site will also be monitored for five years following construction to ensure the success of revegetation efforts to restore areas impacted from removal of riparian revegetation. Thus, impacts of reduced shade and cover from removal of riparian vegetation are not expected to significantly change rearing and migratory behavior of individual salmonids within the action area.

The proposed project will expand the roadway approaches and areas along the river bank where the new abutments will be placed and the additional lane will be constructed. Also, a sediment catchment basin will be constructed to settle out working waters from the eastside construction work pad that will require dewatering. Working waters from this area are expected to be high in turbidity and suspended sediment. Sediment laden water will be pumped into the settling basin created on the floodplain. Suspended sediment will be allowed to settle out and water can percolate through the gravel bar back to the river channel. This sediment material in the catchment basin will be removed by the contractor and gravel fill materials will be relocated at an upland site at the completion of seasonal construction activities.

Stormwater Pollution Prevention Plan (SWPPP) and Spill Prevention Control and Countermeasures Plan (SPPC) will be implemented to maintain water quality within the Navarro River. Implementation of these plans is expected to reduce or avoid sediment and toxic materials from transporting into the river. With the proposed plans to protect water quality, the areas that are proposed for staging and construction, including the in-channel activities are not expected to result in runoff or toxic spills that will adversely affect ESA listed salmonids or critical habitat.

2.5.3 Dewatering and Fish Relocation

To facilitate the completion of the project, a portion of the east side of the Navarro River will need to be dewatered. Placement of gravel for work pads and a temporary bridge crossing will require dewatering and fish removal on the east and west sides of the action area. The total area of 10,800 square feet (0.25 acres) may be required to construct supports and work areas for bridge construction. Isolation of the work areas will commence on June 15 to avoid most adult and smolt age-classes of salmonids that utilize the action area. The project proposes to collect and relocate fish from these work areas prior to, and during, dewatering to avoid fish stranding and exposure to construction activities. The area dewatered and filled with clean gravel for the eastside work pad will be confined to the east side of the river allowing a 20-foot wide channel within the river to be maintained. This channel is expected to be sufficient to provide passage of late migrating salmonid smolts or juvenile steelhead that may reside in the action area throughout the summer.

Before and during dewatering of the construction site, juvenile salmonids will be captured by a qualified biologist using one or more of the following methods: dip net, seine, thrown net, block net, minnow trap, and electrofishing. Collected salmonids will be relocated to an appropriate stream reach that will minimize impacts to captured fish, and to fish that are already residing at the release site. Since construction is scheduled to occur between June 15 and October 1, relocation activities will occur during the summer low-flow period after the majority of smolts have migrated downstream and before adults have begun their spawning migration in the fall. Only juvenile salmonids are expected to be in the action area during this construction period. Therefore, NMFS expects capture and relocation of listed salmonid species will be limited to pre-smolting and young-of-the-year juveniles.

Collection and relocation activities expose juvenile salmonids to injury or mortality. Any fish collecting gear, whether passive (Hubert 1996) or active (Hayes 1983) has some associated risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish capture varies widely, depending on the method used, the ambient conditions, and the expertise and experience of the field crew. Injury and mortality of juvenile salmonids during capture and relocation will be minimized by implementing the dewatering and fish relocation plan proposed in the BA (Caltrans 2021). Qualified biologists will conduct these activities and follow NMFS electrofishing guidelines (NMFS 2000) and other measures to minimize impacts to juvenile salmonids. Based on prior experience with current relocation techniques and protocols likely to be used to conduct the fish relocation, unintentional mortality of listed juvenile salmonids expected from capture and handling procedures is not likely to exceed 3 percent.

Relocated salmonids may also have to compete with other fish causing increased competition for available resources such as food and habitat. Responses to crowding by salmonids include self-thinning, resulting in emigration and reduced salmonid abundance with increased individual body size within the group, and/or increased competition (Keeley 2003). Some of the fish released at the relocation sites may choose not to remain in these areas and move either upstream or downstream to areas that have more vacant habitat and a lower density of fish. As each fish moves, competition remains either localized to a small area or quickly diminishes as fish disperse. In some instances, relocated fish may endure some short-term stress from crowding at the relocation sites. Such stress is not likely to be sufficient to reduce their individual fitness or performance. Although sites selected for relocation fish will be pre-approved by NMFS, they should have similar water temperatures as the capture sites, and should have adequate habitat to allow for survival of transported fish and fish already present. NMFS cannot accurately estimate the number of fish likely to be affected by competition, but does not expect this short-term stress to reduce the individual performance of juvenile salmonids, or affect salmonids at a reach or watershed scale.

Although low numbers of juvenile coho salmon and Chinook salmon are known to occur within the action area, there is some potential for this species to be present during the dewatering and relocation. Therefore, NMFS assumes a small number of juvenile coho and Chinook salmon may be encountered and relocated during dewatering activities.

Applying applicable AMMs to fish collection, relocation, and dewatering activities is expected to appreciably reduce the effects of project actions on juvenile salmonids. Specifically, fish collection and relocation activities conducted by NMFS-approved fisheries biologists will ensure proper equipment operation and application of NMFS guidelines thereby minimizing injury and mortality to juvenile salmonids. Restricting the work window to June 15 through October 1 will limit the effects to stream rearing juvenile salmonids. By implementing the AMMs as proposed in Caltrans (2021), NMFS expects that injury and mortality to juvenile steelhead, coho salmon and Chinook salmon will be avoided and minimized in the action area.

2.5.4 Effects of underwater sound exposure

The dual metric criteria for injury to fish from pile driving was established by the Fisheries Hydroacoustic Working Group (FHWG 2008) and includes a threshold for peak pressure (206 dB) and SEL (187 dB for fishes 2 grams or larger and 183 dB for fishes smaller than 2 grams). Injury would be expected if either threshold is exceeded. There is uncertainty as to the behavioral response of fish to underwater sound produced when driving piles in or near water, NMFS believes a 150-dB root mean square pressure (RMS) threshold for behavioral responses for salmonids is appropriate.

This project includes the placement of sheet piles to form the dewatering area for gravel placement used for work pads and temporary bridge. Driving sheet piles for the dewatering could generate underwater sound pressure levels that could adversely affect juvenile salmonids that weigh less than 2 grams. The County has proposed to monitor sheet pile driving activities and cease actions if decibel levels are approaching 183 dB. As sheet pile is being driven for isolation of the dewatering area, sound pressure levels of 150 dB RMS are expected, which could cause disturbance or behavioral effects to juvenile salmonids. Most juvenile salmonids in the vicinity are expected to move away from the area, reducing the number of individuals present within the area where dewatering and fish relocation will occur.

2.5.5 Project Closure

A temporary access road would be constructed along the gravel bar along the western side of the wetted portion of the channel to accommodate limited as-needed construction activities, such as the installation of the sediment basin and westside work pad. Upon completion of instream work and bridge construction, AMMs will be implemented to reduce runoff of sediment and to revegetate the site. As described above in Section 2.5.2 above, implementation of Stormwater Pollution Prevention Plan (SWPPP) and Spill Prevention Control and Countermeasures Plan (SPPC) are expected to maintain water quality within Navarro River during the post project period when winter rain events occur. These AMMs, such as silt fences and/or fiber rolls that will be placed at bridge abutments, new abutment excavation areas, and any other disturbed areas where construction work could result in loose sediment that has the potential to enter the river. The silt fence/fiber rolls would be maintained and kept in place for the duration of the project. Any sediment or debris captured by the fence/rolls will be removed before the fence/rolls are removed. Additional erosion, sediment, and material stockpile AMMSs would be implemented to disturbed areas in order to avoid runoff to the stream channel. With these measures in place, NMFS does expect that salmonids within the action area to be exposed to measurable or significant erosion from the construction site.

Although the proposed project addresses the potential run-off from the construction of the new bridge, post construction stormwater BMPs were not proposed as part of the project to address water quality concerns associated with road projects as detailed by numerous sources such as the SWRCB. The SWRCB has issued a storm water permit for Caltrans, which includes background information from a recent publication that identifies a degradation product of tires as the causal factor in salmonid mortalities at concentrations of less than a part per billion (Tian et al., 2020). This contaminant is widely used by multiple tire manufacturers and the tire shreds that produce it have been found to be ubiquitous where both rural and urban roadways drain into waterways (Sutton et al., 2019).   Previous published work first focused on identifying the issue and determining the cause of observed mortalities of adult coho salmon in the wild (Scholz et al., 2011) and then showed mortality to juvenile coho salmon in laboratory settings (Chow et al., 2019). More recent examinations of juvenile steelhead and Chinook salmon by NMFS Northwest Fisheries Science Center and partners also indicate mortality of up to 40 percent for steelhead and up to 10 percent for Chinook (Tian et al., 2020). The presence of coho salmon, Chinook salmon and steelhead will likely coincide with the rainy season that may bring them into contact with contaminants from the bridge and roadway. Therefore, run-off from the bridge deck and the road approaches to the new bridge are likely to deliver tire shreds to the stream channel and result in adverse effects to salmonids within the action area. Mortality is not expected due to the rural setting of the proposed project and adverse effects that may be minimized with proper road drainage at the site.

2.5.6 Critical Habitat Effects

The action area is designated critical habitat for CCC coho salmon, and NC steelhead. Generally speaking, PBFs of critical habitat for both steelhead and salmon found within the action area include sites for migration, spawning, and rearing (see section 2.4). Effects of the Project on designated critical habitat include temporary disturbance to the streambed, bank, and flow from dewatering; temporary disturbance to waterways from pile driving; temporary and permanent loss of riparian vegetation during construction access and staging; and temporary loss of habitat from proposed dewatering activities.

Regarding effects to critical habitat from project site dewatering, for the same reasons described above for juvenile salmonids, adverse effects to CCC coho salmon, and NC steelhead and critical habitat PBFs are expected to be temporary, insignificant, and will recover relatively quickly (one to two months) after the project site is re-watered. Similarly, for reasons described above for juvenile salmonids, turbidity levels from suspended sediment are not expected to occur or effect the value of critical habitat in the action area. Based on the size of the area to be dewatered (2,000 square feet) for the instream construction activities, there will be a reduction in available wetted habitat over the proposed June 15 to October 15 construction window. NC steelhead juveniles are the only species that will experience a small loss in available habitat from the construction of the east bank work pad and temporary bridge supports (a total of 10,800 square feet). The action area will remain wetted during the construction period, but provides marginal habitat for NC steelhead, therefore this temporary loss of wetted habitat is not expected to result in a significant impact to the available critical habitat for steelhead.

Minor impacts to LWD recruitment and shade are expected to reduce habitat quality in the action area. Loss of LWD from removal of streambanks will reduce the potential for removed trees to recruit to the channel and provide habitat in the future. The loss of this LWD recruitment is not expected to significantly reduce cover or habitat forming roughness elements in the Navarro River channel. Revegetation proposed by the County is expected to provide similar shade to the action area within 2-5 years of project completion.

2.6. Cumulative Effects

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

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

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 CCC coho salmon population in the Navarro River is considered an independent population, or focus population that is key to the recovery of the Navarro Point – Gualala Point diversity stratum. The majority of the current adult population in the Navarro River resides in the North Fork subwatershed, which is downstream from the action area. A small number of adult fish are known to occur in the Mill Creek subwatershed that enters the mainstem Navarro River a few miles downstream of the action area. A small number of adult coho salmon could migrate into larger tributaries upstream of the action area which could result in juvenile fish migrating downstream during the project dewatering activities. Given the low numbers of coho currently utilizing the mainstem and tributaries upstream of the action area we expect very low numbers of juveniles to be collected as a result of the proposed project. We agree with Caltrans (2021) that estimates less than 10 juvenile coho salmon will be collected when dewatering and relocation activities are conducted. The collection of a low number of coho salmon is not expected to significantly reduce the likelihood of both the survival and recovery of endangered CCC coho salmon in the wild by reducing its numbers, reproduction, or distribution. The effects during project construction will occur during the summer period when coho juveniles are not expected to reside in the mainstem river, therefore, the effects to wetted habitat are not to appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

CC Chinook salmon status remains as threatened (NMFS 2016a) due to the continuing threats that face this species including poor ocean conditions, drought and reduced freshwater habitat quality. Throughout the ESU there has been a mix in the population trends, with some population abundance increasing and others decreasing (NMFS 2016a). Overall, there is a lack of compelling evidence to suggest that the status of these populations has improved or deteriorated appreciably since the previous status review (Williams et al. 2011). The incidental take of a low number (less than 10) Chinook salmon is unlikely to reduce the overall abundance of the Chinook salmon population in the Navarro River. The reduction in habitat quality within the action area is not expected to reduce spawning or rearing habitat quality in the action area. The proposed project is not expected to limit the number of CC Chinook salmon utilizing the Navarro River given the low likelihood of Chinook salmon in the mainstem Navarro River and low potential for juvenile fish to be present in the action area during the summer work window.

The Navarro River "independent" population serves an essential role in the NC steelhead recovery effort (NMFS 2016a). A small number of steelhead inhabiting the action area may experience a reduced likelihood of survival prior to reaching the smolt lifestage and migrating to sea, primarily due to collection and relocation actions. However, the anticipated small loss of juvenile steelhead is unlikely to appreciably impact the future survival and recovery at the DPS scale since adequate quantities of habitat remain within the tributary reaches of the North Fork Navarro River and the upper mainstem Navarro River. The minor loss in available wetted habitat for NC steelhead in the mainstem Navarro is not expected to appreciably diminish the value of designated critical habitat as a whole for the conservation of the species.

Global climate change presents another real threat to the long-term persistence of CCC coho salmon, CC Chinook salmon and NC steelhead, especially when combined with the current depressed population status and human caused impacts. Regional (i.e., North America) climate projections for the mid to late 21st Century expect more variable and extreme inter-annual weather patterns, with a gradual warming pattern in general across California and the Pacific Northwest. However, extrapolating these general forecasts to our smaller action area is difficult, given local nuances in geography and other weather-influencing factors. Water temperatures may rise somewhat in the action area due to climate change over the next several decades, with the likelihood of reduced carrying capacity in the action area due to an increased frequency of drought and an increase in ambient air temperatures.

The proposed action will degrade PBFs and essential habitat types in the action area, namely those related to juvenile rearing for NC steelhead. Yet, the effects of the proposed action, when added to the environmental baseline, cumulative effects, and species status, are not expected to appreciably reduce the quality and function of critical habitat at the larger CCC coho salmon ESU or the NC steelhead DPS, given the small area being degraded compared to the quality and quantity of habitat within the Navarro River watershed. Thus, the proposed action will not impair the ability of critical habitat to play its intended conservation role of supporting populations of CCC coho salmon and NC steelhead at the ESU and DPS levels.

2.8. Conclusion

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

After reviewing and analyzing the current status of the listed species, 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 threatened CC Chinook salmon.

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 threatened NC steelhead and or 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 take exemption conferred by this incidental take statement is based upon the proposed action occurring as described in the Biological Opinion and in more detail in the Caltrans Biological Assessment.

2.9.1. Amount or Extent of Take

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

Take of ESA listed juvenile CCC coho salmon, CC Chinook salmon and NC steelhead may occur during fish relocation in a 10,800 square foot area at the project site commencing on June 15 for two construction seasons. The number of NC steelhead that may be incidentally taken during dewatering activities is expected to be small, and limited to the pre-smolt and young-of-year juvenile life stage. NMFS expects that no more than 3 percent of juvenile steelhead within the dewatered area of the Navarro River will be injured, harmed, or killed during fish relocation and dewatering activities. If more than 3 percent of the total number of juvenile steelhead captured are harmed or killed, incidental take will have been exceeded.

Similarly, the number of CCC coho salmon and CC Chinook salmon that may be incidentally taken during dewatering activities is expected to be low (as a result of migration since most juveniles will migrate to estuarine or marine environments by June 15 of each year), and will be limited to the pre-smolt/young-of-year juvenile life stage. NMFS expects that no more than 3 percent of the fish within the 10,800 square foot fish relocation area of the action area will be injured, harmed, or killed during fish relocation and dewatering activities. Low numbers of juvenile salmon are expected to be in the action area with an estimate of less than 10 individual coho salmon and 10 Chinook salmon collected and relocated as a result of this project. If more than 3 percent of the total number of juvenile CC Chinook salmon captured are harmed or killed, incidental take will have been exceeded.

2.9.2. Effect of the Take

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

2.9.3. Reasonable and Prudent Measures

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

1. Undertake measures to ensure that injury and mortality to salmonids resulting from fish relocation and dewatering activities is low;
2. undertake measures to minimize harm to salmonids from construction of the project and degradation of aquatic habitat;
3. Implement measures to reduce direct delivery of run-off from road approaches and the bridge deck to the Navarro River;
4. prepare and submit plans and reports regarding the effects of fish relocation, and post-construction revegetation performance.

2.9.4. Terms and Conditions

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

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

   a. The Caltrans/County shall retain a qualified biologist with expertise in the areas of anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid/habitat relationships; and biological monitoring of salmonids. The applicant shall ensure that all fisheries biologists working on this project are qualified to conduct fish collections in a manner which minimizes all potential risks to ESA-listed salmonids.

   b. The fisheries biologist shall monitor the construction site during placement and removal of cofferdams, and sediment catchment basins to ensure that any adverse effects to salmonids are minimized. The biologist shall be on site during all dewatering events in anadromous fish streams to ensure that all ESA-listed salmonids are captured, handled, and relocated safely. During fish relocation activities the fisheries biologist shall contact NMFS North Coast Branch staff at

(7070 575-6050, if mortality of federally listed salmonids exceeds 3 percent of the total for each species collected, at which time NMFS will stipulate measures to reduce the take of salmonids.

c. If ESA-listed fish are handled, it shall be with extreme care and they shall be kept in water to the maximum extent possible during rescue activities. All captured fish shall be kept in cool, shaded, aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream and fish shall not be removed from this water except when released. To avoid predation the biologist shall have at least two containers and segregate young-of-year salmonids from larger age-classes and other potential aquatic predators. Captured salmonids will be relocated as soon as possible to a suitable instream location (pre-approved by NMFS) where suitable habitat conditions are present to allow for survival of transported fish and fish already present.

d. Non-native fish that are captured during fish relocation activities shall not be relocated to anadromous streams, or areas where they could access anadromous habitat.

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

a. Caltrans/County will allow any NMFS employee(s) or any other person(s) designated by NMFS to accompany field personnel to visit the project site during activities described in this opinion.

b. Upon project completion Caltrans/County shall revegetate access roads and repair bank areas to pre-project slope and form. Between construction seasons, access roads shall be made inaccessible to vehicles in order to prevent access to the river channel.

c. Construction equipment used within the river channel will be checked each day prior to work within the river channel (top of bank to top of bank) and, if necessary, action will be taken to prevent fluid leaks. If leaks occur during work in the channel, Caltrans or their contractors will contain the spill and removed the affected soils.

d. Once construction is completed, all project-introduced material must be removed, leaving the river as it was before construction. Excess materials will be disposed of at an appropriate upland disposal site. Minor grading to return the channel to pre- project form can be performed if necessary.

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

a. Caltrans/County must implement measures to minimize road generated run-off to Navarro River by diverting road surface flow to vegetated areas between the road and the stream channel.

b. Measures should be implemented to reduce run-off from the bridge deck to Navarro River.

c. Any structures such as relief ditches, grading to direct flow, other diversion structures must receive regular long-term maintenance, with a focus on early fall to reduce run-off from the first rains that cause flush of materials accumulated from the summer months.

4. The following terms and conditions implement reasonable and prudent measure 4:

a. **Project Construction and Fish Relocation Report** – Caltrans must provide a written report to NMFS by January 15 of the year following each construction season. The report must be submitted to NMFS' North-Central Coast Office, Attention: North Coast Branch Chief, 777 Sonoma Avenue, Room 325, Santa Rosa, California, 95404-6528. The report must contain, at minimum, the following information:

i. **Construction related activities** – The report(s) must include the dates construction began and was completed; a discussion of any unanticipated effects or unanticipated levels of effects on salmonids, including a description of any and all measures taken to minimize those unanticipated effects and a statement as to whether or not the unanticipated effects had any effect on ESA-listed fish; the number of salmonids killed or injured during the project action; and photographs taken before, during , and after the activity from photo reference points.

ii. **Fish relocation** – The report(s) must include a description of the location from which fish were removed and the release site(s) including photographs; the date and time of the relocation effort; a description of the equipment and methods used to collect, hold, and transport salmonids; if an electrofisher was used for fish collection, a copy of the logbook must be included; the number of fish relocated by species; the number of fish injured or killed by species and a brief narrative of the circumstances surrounding ESA-listed fish injuries or mortalities; and a description of any problems which may have arisen during the relocation activities and a statement as to whether or not the activities had any unforeseen effects.

b. **Post-Construction Vegetation Monitoring and Reporting** – Reports documenting post-project conditions of vegetation installed at the site will be prepared and submitted annually for the first five years following project completion. Reports will document vegetation health and survivorship and percent cover, natural recruitment of native vegetation (if any), and any maintenance or replanting needs. Photographs must be included. If poor establishment is documented, the report must include recommendations to address the source of the performance problems. Annual reports shall be sent to the address above in 4a.

2.10. Conservation Recommendations

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

- NMFS has no conservation recommendations

2.11. Reinitiation of Consultation

This concludes formal consultation for the Navarro River Bridge Rehabilitation and Widening Project. Under 50 CFR 402.16(a): "Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action."

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

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

This analysis is based, in part, on the EFH assessment provided by Caltrans and descriptions of EFH for Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1. Essential Fish Habitat Affected by the Project

Pacific coast salmon EFH may be adversely affected by the proposed action. Specific habitats identified in the PFMC (2014) for pacific coast salmon include habitat areas of particular concern (HAPCs), identified as: 1) complex channels and floodplain habitats; 2) thermal refugia; and 3) spawning habitat. HAPCs for CCC coho salmon include all waters, substrates, and associated biological communities falling within critical habitat areas described above in the accompanying biological opinion for the project located on the Navarro River. Essentially, all CCC coho salmon habitat located within the proposed action is considered HAPC as defined in PFMC (2014).

3.2. Adverse Effects on Essential Fish Habitat

The potential adverse effects of the Project on EFH have been described in the preceding biological opinion and include disturbance of the channel bed and banks, temporary loss of wetted habitat, and temporary loss of riparian vegetation. Therefore, the effects of the project on ESA-listed species are anticipated to be the same as the effects to EFH in the action area.

3.3. Essential Fish Habitat Conservation Recommendations

Section 305(b)(4)(A) of the MSA authorizes NMFS to provide EFH Conservation Recommendations that will minimize adverse effects of an activity on EFH. Although temporary potential adverse effects are anticipated as a result of the project activities, the proposed minimization and avoidance measures, and best management practices in the accompanying biological opinion are sufficient to avoid, minimize, and/or mitigate for the anticipated affects. Therefore, no additional EFH Conservation Recommendations are necessary at this time that would otherwise offset the adverse effects to EFH.

3.4. Supplemental Consultation

Caltrans must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that effects the basis for NMFS' EFH Conservation Recommendations (50 CFR600.920(1)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

4.1. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the California Department of Transportation (Caltrans) and the Mendocino County Department of Transportation and individual copies of this opinion were provided to Caltrans. The document will be available within 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adhere to conventional standards for style.

4.2. Integrity

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

4.3. Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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