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

October 23, 2023 **Refer to NMFS No:** WCRO-2023-01045

William M. Connor
North Branch Chief, Regulatory Division
U.S. Department of the Army
Corps of Engineers, San Francisco District
1455 Market Street
San Francisco, California 94103-1398

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the West Fork Russian River Bank Stabilization

Dear Mr. Connor:

Thank you for your letter of June 15, 2023, requesting reinitiation 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 West Fork Russian River Bank Stabilization project. Also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson–Stevens Fishery Conservation and Management Act [16 U.S.C. 1855(b)] for this action.

The enclosed biological opinion is based on our review of the Corps' permitting of the Project, and describes NMFS' analysis of potential effects on threatened California Coastal (CC) Chinook salmon (*Oncorhynchus tshawytscha*) and Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) and their designated critical habitat, in accordance with Section 7 of the ESA. Threatened CCC steelhead and CC Chinook salmon utilize habitat within the Project's action area, and the West Fork Russian River is designated critical habitat for both CCC steelhead and CC Chinook salmon as well as endangered CCC coho salmon. In the enclosed biological opinion, NMFS concludes the project is not likely to jeopardize the continued existence of threatened CCC steelhead, and threatened CC Chinook salmon, nor is it likely to adversely modify critical habitat designated for these species. However, NMFS is aware that take of these species may occur because of project construction, and thus, an incidental take statement that applies to this project is included with the enclosed biological opinion. We also include the potential affects to critical habitat for (CCC) coho salmon (*Oncorhynchus kisutch*) and omit inclusion of effects to species of CCC coho salmon because they have not been present in the West Fork Russian River for decades.

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 at 707-575-6050 or tom.daugherty@noaa.gov if you have any questions concerning this Section 7 consultation, or if you require additional information.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: e-file FRN 151422WCR2019SR00130

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

West Fork Russian River Bank Stabilization

NMFS Consultation Number: WCRO-2023-01045
Action Agency: U.S. Army Corps of Engineers

Affected Species and NMFS' Determinations

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely to Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely to Destroy or Adversely Modify Critical Habitat?
CCC steelhead	Threatened	Yes	No	Yes	No
CC Chinook	Threatened	Yes	No	Yes	No
CCC coho salmon	Endangered	No	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 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: October 23, 2023

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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 California Coastal NMFS office.

1.2. Consultation History

On August 1, 2018 NMFS issued a biological opinion for the West Fork Bank Stabilization Project (WCR-2018-9282) in Mendocino County, California. Within the Corps jurisdiction, this previous action proposed to regrade approximately 350 linear feet of stream bank and discharge approximately 3,864 tons of rip-rap and 75 cubic yards of woody debris within the ordinary-high-water (OHW) mark along approximately 850 linear feet of West Fork Russian River. From 2018 to 2022, the applicant constructed a portion of the western river bank, which has been regraded and reshaped within portions of Repair Area 1 (550 feet) and Repair Area 2 (550 feet). To date, a keyway (5 feet by 10 feet deep, sloped at 1.5:1) has been built along approximately 400 feet of riverbank. On June 15, 2023 the USACE reinitiated interagency consultation for the West Fork Russian River Bank Stabilization project to complete construction of the project with minor changes to the design. NMFS reviewed the reinitiation request and accepted the proposed project for ESA and EFH consultation on June 29, 2023.

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 ("2019 Regulations," see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government's request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on

November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the biological opinion and incidental take statement would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different.

1.3. Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (see 50 CFR 402.02). 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.

The project is being proposed and implemented at the discretion of the Coyote Valley Tribe under authority of the USACE. The proposed project includes bank stabilization along the west bank of the West Fork Russian River, within the Coyote Valley Reservation and a small portion of private ownership located in Redwood Valley, California.

To protect the Repair Areas and the remaining sections of the bluff from erosion and undercutting, additional slope protection is proposed. On the basis of recent evaluations, rock riprap placed over the
Repair Areas (1,100 feet length by 5 feet high) is the most suitable slope protection. In order to protect the Repair Area in the long term a 30-foot high shotcrete soil nail wall (approximately 843 feet in length) will be installed. The toe of the shotcrete wall will be protected by the installation of larger riprap along the entire length of the shotcrete wall. The upper portions of the riverbank will be laid back at a 1 foot horizontal to 1 foot vertical (1H:1V) grade, erosion controlled and vegetated. The Repair Area will be further protected in the long term by restoring 250 feet of riverbank upstream on a private property owner (Martinson parcel) by slightly flattening the slope and planting with native vegetation.

Above the soil nail wall to the top of bank, approximately 17,000 cubic yards of material will be excavated to lay the slope back to a graded slope of 1H:1V and will include a vegetative wall. A 12" deep cut-off swale (with a minimum width of 2 feet) will be constructed above the cut slope to redirect drainage away from the newly created vegetated slope. This step will be done in two seasons. The first construction season would involve constructing of the soil nail wall, excavating keyway and installation of rip rap. During the second construction season, the slope will be laid back above the soil nail wall.

Access and Staging

Staging will occur in an existing flat parking area on the reservation, above the top of bank of the West Fork Russian River. The same access for vehicles and heavy equipment and trucks will be required for Repair Area Stabilization, and Upstream Stabilization. Accessing the River with vehicles and equipment will require improving the access to the river channel upstream of Repair Area so that heavy equipment such as dump trucks can access the project area. The private property owner on the western riverbank upstream of the Reservation has agreed to work with the Tribe on road improvements and has allowed the Tribe use of his existing native surface road to access the stream channel. This road runs from his commercial vineyard north of the Coyote Valley Reservation to the northern end of the project area. The road has been improved by laying base material and rock. This access road is outside of the River/ordinary high-water mark (OHWM). Within the stream channel, the access road would consist of driving on existing native riverbed materials with equipment (excavator and rubber-tired trucks) when the channel is dry. The riverbed would be graded/flattened to facilitate safe movement of vehicles, and prior to grading, the pools in the riverbed would be mapped to allow recontouring of pools after project completion. Assuming grading is on average 1 foot deep, this would require between 700 to 900 cy of fill within the OHWM to improve the access route in the riverbed. After installation, this access road would be removed and pools in the riverbed bottom would be recontoured to prior condition, to the extent feasible.

Up to 18 trees with diameter breast height over 4 inches, several shrubs, and a vineyard fence have been removed in order to provide a turning radius adequate for heavy equipment to access the road from the staging area. Adjacent to the River, the road has been repaired and slightly widened where it has suffered storm damage (approximately 28 trees have been trimmed or removed in the road alignment). Erosion control measures have been followed in the improvement and use of these areas upon completion of each construction stage at this point.

The biological assessment (Panorama Environmental, Inc. 2023) for the Project outlines avoidance and minimization measures to be implemented during the phased project construction. These include measures to minimize disturbance at the site, avoid impacts to water quality, protection of riparian areas and minimizing effects to sensitive species. In summary, vehicle access will be restricted to minimize disturbance of the site, and staging and storage of materials will be located outside of the river including spoils developed from the project. Measures also include riparian avoidance and mitigation, and plans to relocate federally listed species by qualified biologists. A complete list of these avoidance and minimization of project impacts can be found in Panorama Environmental, Inc. (2023).

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

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

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

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

indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.

- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2. Rangewide Status of the Species and Critical Habitat

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

This biological opinion analyzes the effects of the action on the following listed salmonids and their designated critical habitat:

- **Endangered CCC coho salmon (*Oncorhynchus kisutch)* Evolutionarily Significant Unit (ESU)**
  Critical habitat designation (64 FR 24049; May 5, 1999);

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

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

Critical habitat is designated for CCC coho salmon in all accessible reaches throughout the ESU, however, CCC coho salmon are not currently known to inhabit the upper Russian River watershed area of the West Fork Russian River. Therefore, NMFS has determined the proposed action is not likely to affect endangered CCC coho salmon. Therefore, this biological opinion does not further analyze effects to individual CCC coho salmon as there are no expected effects to this species.

2.2.1 Species Description and Life History

Chinook Salmon

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

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

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

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

Steelhead

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

Steelhead can be divided into two reproductive ecotypes, based upon their state of sexual maturity at the time of river entry and the duration of their spawning migration: stream maturing and ocean maturing. Stream maturing steelhead enter fresh water in a sexually immature condition and require several months to mature and spawn, whereas ocean maturing steelhead enter fresh water with well-developed gonads and spawn shortly after river entry. These two reproductive ecotypes are more commonly referred to by their season of freshwater entry (i.e., summer [stream maturing] and winter [ocean maturing] steelhead). The timing of upstream migration of winter steelhead is correlated with higher flow events, such as freshets or sandbar breaches. Adult summer steelhead migrate upstream from March through September. In contrast to other species of Oncorhynchus, steelhead may spawn more than one season before dying (iteroparity); although one-time spawners represent the majority.

Because rearing juvenile steelhead reside in freshwater all year, adequate flow and temperature are important to the population at all times (CDFG 1997). Outmigration appears to be more closely associated with size than age. In Waddell Creek, Shapovalov and Taft (1954) found steelhead juveniles migrating downstream at all times of the year, with the largest numbers of young-of-year and age 1+ steelhead moving downstream during spring and summer. Smolts can range from 5.5 to 8 inches in length. Steelhead outmigration timing is similar to coho salmon (CDFG 2002).

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

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

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

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

2.2.2 Status of Species

In this biological opinion, NMFS assesses four population viability parameters to help us understand the status of each species populations 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 2012a) and NOAA Fisheries' Coastal Multispecies Recovery Plan (NMFS 2016), 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.

CC Chinook Salmon

The CC Chinook salmon ESU was historically comprised of approximately 32 Chinook salmon populations (Bjorkstedt et al. 2005). Many of these populations (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 and Manning 2022).

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 (J. Jahn, NMFS, personal communication 2010). Ocean conditions are suspected as the principal short-term cause because of the wide geographic range of declines (SFSC 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 2016 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 (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 and Pearse 2008), 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 SFSC 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 (Spence 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). The new information available since 2016 indicates that recent trends across the ESU have been mixed and that overall extinction risk for the ESU is moderate and has not changed appreciably since the previous viability assessment (SFSC 2022).

The NMFS's recovery plan (NMFS 2016) for the CC Chinook salmon ESU identified the major threats to recovery. These major threats include channel modification, roads, logging and timber harvesting; water diversions and impoundments; and severe weather. The impacts of these major threats are described in the effects to critical habitat section. New threats to Chinook salmon populations identified since the last status review include poor ocean conditions, drought, and marijuana cultivation (Seghesio and Wilson 2016).

CCC Steelhead

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

While historical and present data on abundance are limited, CCC steelhead numbers are substantially reduced from historical levels. A total of 94,000 adult steelhead were estimated to spawn in the rivers of this DPS in the mid-1960's, including 50,000 fish in the Russian River – the largest population within the DPS (Busby et al. 1996). Near the end of the 20th century, McEwan (2001) estimated that the wild steelhead population in the Russian River watershed was between 1,700 and 7,000 fish. Abundance estimates for smaller coastal streams in the DPS indicate low but stable levels, with recent estimates for several streams (Lagunitas, Waddell, Scott, San Vicente, Soquel, and Aptos creeks) of individual run sizes of 500 fish or less (62 FR 43937).

Some loss of genetic diversity has been documented and attributed to previous among-basin transfers of stock and local hatchery production in interior populations in the Russian River (Bjorkstedt et al. 2005). In San Francisco Bay streams, reduced population sizes and habitat fragmentation has likely also led to loss of genetic diversity in these populations. For more detailed information on trends in CCC steelhead abundance, see: Busby et al. 1996, NMFS 1997, Good et al. 2005, and Spence et al. 2008.

CCC steelhead have experienced serious declines in abundance and long-term population trends suggest an adverse growth rate. This indicates the DPSs may not be viable in the long term. DPS populations that historically provided enough steelhead immigrants to support dependent populations may no longer be able to do so, placing dependent populations at increased risk of extirpation. However, because CCC steelhead have maintained a wide distribution throughout the DPS, roughly approximating the known historical distribution, CCC steelhead likely possess a resilience that is likely to slow their decline relative to other salmonid DPSs or ESUs in worse condition. The 2005 status review concluded that steelhead in the CCC steelhead DPS remain "likely to become endangered in the foreseeable future" (Good et al. 2005), a conclusion that was consistent with a previous assessment (Busby et al. 1996) and supported by the NMFS Technical Recovery Team work (Spence et al. 2008). On January 5, 2006, NMFS issued a final determination that the CCC steelhead DPS is a threatened species, as previously listed (71 FR 834). Although numbers did not decline further during 2007/08, the 2008/09 adult CCC steelhead return data indicated a decline in returning adults across their range. Escapement data from 2009/2010 indicated a slight increase; however, the returns were still well below data observed within recent decades (J. Jahn, personal communication, 2010).

A status review by Williams et al. (2011) concluded that steelhead in the CCC steelhead DPS remain “likely to become endangered in the foreseeable future” (Williams et al. 2011), which affirmed no change to the determination that the CCC steelhead DPS is a threatened species, as previously listed (NMFS 2011c, 76 FR 76386).

The status review by NMFS (Howe 2016) found that the scarcity of information on steelhead abundance in the CCC DPS continues to make it difficult to assess whether conditions have changed appreciably since the previous status review of Williams et al. (2011), which concluded that the population was likely to become endangered in the foreseeable future. In the North Coastal and Interior strata, steelhead still appear to occur in the majority of watersheds, though in the Russian River basin, the ratio of hatchery fish to natural origin fish returning to spawn remain largely unknown and continues to be a source of concern. New information from 3 years of CMP implementation in the Santa Cruz Mountain stratum indicates that population sizes are perhaps higher than previously thought. However, the downward trend in the Scott Creek population, which has the most robust estimates of abundance, is a source of concern. The status of populations in the two San Francisco Bay diversity strata remains highly uncertain, and it is likely that many populations where historical habitat is now inaccessible due to dams and other passage barriers are at high risk of extinction (Howe 2016). In summary, while data availability for this DPS remains generally poor, the new information for CCC steelhead available since the previous viability assessment (Spence 2016) indicates that overall extinction risk is moderate and has not changed appreciably since the prior assessment (Spence 2022).

The NMFS’s recovery plan (NMFS 2016) for the CCC steelhead DPS identified the major threats to recovery. These major threats include channel modification, residential and commercial development; roads, and water diversions and impoundments. The impacts of these major threats are described in the effects to critical habitat section.

2.2.3 Status of Critical Habitat

In designating critical habitat, NMFS considers, among other things, the following requirements of the species: 1) space for individual and population growth, and for normal behavior; 2) food, water, air, light, minerals, or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for breeding, reproduction, or rearing offspring; and, generally; and 5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species (50 CFR 424.12(b)). In addition to these factors, NMFS also focuses on physical 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 CC Chinook salmon, CCC coho salmon and CCC steelhead critical habitat, and their associated essential features within freshwater include:

1. freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;
2. freshwater rearing sites with:
   a. water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
   b. water quality and forage supporting juvenile development; and
   c. natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks;
3. freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

The condition of 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.

2.2.4 Climate Change

Another factor affecting the range wide status of CC Chinook salmon, CCC coho salmon and CCC steelhead aquatic habitat at large is climate change. Recent work by the NMFS Science Centers ranked the relative vulnerability of west-coast salmon and steelhead to climate change.

In California, listed coho and Chinook salmon are generally at greater risk (high to very high risk) than listed steelhead (moderate to high risk) (Crozier et al 2019).

Impacts from global climate change are already occurring in California. For example, average annual air temperatures, heat extremes, and sea level increased in California over the last century (Kadir et al. 2013). Snowmelt from the Sierra Nevada has declined (Kadir et al. 2013). Although CCC steelhead, and CC Chinook salmon are not dependent on snowmelt driven streams, they have likely already experienced some detrimental impacts from climate change through lower and more variable stream flows, warmer stream temperatures, and changes in ocean conditions. California experienced well below average precipitation during the 2012-2016 drought, as well as record high surface air temperatures in 2014 and 2015, and record low snowpack in 2015 (Williams et al. 2016). Paleoclimate reconstructions suggest the 2012-2016 drought was the most extreme in the past 500 to 1000 years (Williams et al. 2016, Williams et al. 2020, Williams et al. 2022). Anomalously high surface temperatures substantially amplified annual water deficits during 2012-2016. California entered another period of drought in 2020. These drought periods are now likely part of a larger drought event (Williams et al. 2022). This recent long-term drought, as well as the increased incidence and magnitude of wildfires in California, have likely been exacerbated by climate change (Williams et al. 2020, Williams et al. 2022, Diffenbaugh et al. 2015, Williams et al. 2019).

The threat to listed salmonids from global climate change is expected to increase in the future. Modeling of climate change impacts in California suggests that average summer air temperatures are expected to continue to increase (Lindley et al. 2007; Moser et al. 2012). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe et al. 2004; Moser et al. 2012; Kadir et al. 2013). Total precipitation in California may decline and the magnitude and frequency of dry years may increase (Lindley et al. 2007; Schneider 2007; Moser et al. 2012). Similarly, wildfires are expected to increase in frequency and magnitude (Westerling et al. 2011; Moser et al. 2012). Increases in wide year-to- year variation in precipitation amounts (droughts and floods) are projected to occur (Swain et al. 2018). 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). Some of these changes, including an increased incidence of marine heat waves, are likely already occurring, and are expected to increase (Frolicher et al. 2018). In fall 2014, and again in 2019, a marine heatwave, known as "The Blob", formed throughout the northeast Pacific Ocean, which greatly affected water temperature and upwelling from the Bering Sea off Alaska, south to the coastline of Mexico. The marine waters in this region of the ocean are utilized by salmonids for foraging as they mature (Beamish 2018). Although the implications of these events on salmonid populations are not fully understood, they are having considerable adverse consequences to the productivity of these ecosystems and presumably contributing to poor marine survival of salmonids.

2.3. Action Area

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

The action area for the Project encompasses the west streambank, the active channel of West Fork Russian River, and the stream reach downstream of the proposed project. The total stream reach where listed species may be affected is within the proposed project limits is 1,100 feet within Repair Area 1 and 2, which includes 250 feet of private property (i.e., the Martinson parcel). In addition, we include 1,700 feet below the project within the stream channel, for a total of 3,050 feet. Impacts to critical habitat are less due to tribal land being exempted from critical habitat (70FR 52488). The action area for critical habitat is 850 feet less than that for listed species, for a total of 2,200 feet.

We include the stream reach below the project for a distance of 1,700 feet due to the potential effects of this relatively large bank stabilization project on downstream river reach. This reach includes the stream channel and associated floodplain downstream to the confluence of Forsythe Creek the first major tributary downstream of the project. Forsythe Creek is relatively large tributary (47.7 square mile watershed) that meets the West Fork Russian River 1,700 feet downstream. This reach is included due to potential sediment releases and hydraulic changes that could impact species and habitat below the Project. We end the action area at Forsythe Creek because this watershed produces large flow events that will likely provide sufficient stream flow to ameliorate project effects just downstream of the confluence with the West Fork Russian River. Additional areas included in the action area include the access road located on the northern portion of the project area, and staging areas 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 West Fork Russian River drains an area of approximately 37 square miles, with the action area located at the downstream end of the watershed just prior to the confluence with the Forsythe Creek watershed. Stream flow in the action area varies from intermittent flow in the summer to high flow events that reach 7,000 cubic feet per second during a 100-year storm event (LACO Associates 2017). Garcia and Associates (2017) reports that 50 feet of the streambank within the action area has been eroded since 1972, with much of this retreat having occurred prior to 2007. This bank erosion has continued along various sections of the proposed project since 2007, with large amounts of material continually being eroded and increasing the threat to tribal housing (LACO Associates 2017). Due to the ongoing active erosion within the action area, properties and houses owned by the Redwood Valley band of Pomo Tribe are now threaten.

In part, human impacts such as the construction of Coyote Valley Dam and past gravel mining have caused the channel to incise and contribute to streambank failure observed in many tributaries of the Russian River. While the bluff/streambank at the proposed project site initially formed due to uplift, off-site human activity has increased channelization and decreased the size of the floodplain on the opposite (eastern) riverbank (Garcia and Associates 2017). Historically, and in more recent years armoring the opposite bank (e.g., car bodies), development of agriculture adjacent to the West Fork Russian River, and other channel modifications upstream likely contributed to the erosion problems in the action area.

Currently the status of wild steelhead populations in the West Fork Russian River is unknown. Steelhead and Chinook salmon currently utilize the West Fork Russian River for spawning and rearing (Panorama Environmental, Inc. 2023). Since the completion of the Mumford Dam Fish Passage project in 2003, migrating adult Chinook salmon and steelhead have been observed annually passing the restoration site (SCWA 2008). The Mumford Dam Fish Passage Project restored a few miles of habitat in the upper reaches of the West Fork Russian River and Corral Creek. Approximately five miles of habitat exists downstream of Mumford Dam on the West Fork Russian River prior to East Fork confluence which meet to form the mainstem Russian River. Low densities of juvenile steelhead are known to occur throughout reaches West Fork Russian River due to extremely low stream flow in the summer. Surveys conducted by the SCWA in the summer of 2001 found 40 juvenile steelhead in a 600-foot reach below the project site (Benkert, SCWA, personal communication, 2002). Fish collection and relocation associated with the previous West Fork Russian Bank Stabilization conducted in 2019 (original action for this consultation) collected fish from one pool that contained California roach (*Hesperoleucus symmetricus*), Sacramento suckers (*Catostomus occidentalis*), hardheads (*Mylopharodon conocephalus*), and one steelhead trout approximately four inches long (Ganda and Associates 2019). Fish relocation in 2022 at the same site found seven juvenile steelhead ranging from 75mm to 125mm in length (Torrey Pines Environmental 2022).

Forsythe Creek which is major tributary to the West Fork Russian River also has CCC steelhead present, but no known population estimates exist for this tributary stream. Elevated stream temperatures during the summer may limit steelhead juvenile rearing opportunities in the West Fork Russian River. Young of the year steelhead may likely move downstream into the mainstem Russian River where temperatures are more suitable due to summer water releases from Lake Mendocino. Juvenile Chinook salmon rear in the action area until early spring when they outmigrate to the ocean. Overall, steelhead abundance and habitat capacity in the West Fork Russian River is limited by elevated stream temperatures and reduced stream flow during the summer months.

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).

2.5.1 Impacts to Chinook salmon and Steelhead

Juvenile salmonids residing within the project area are expected to be directly affected by proposed dewatering and fish relocation and indirectly affected by post project affects that may impact habitat conditions.

The proposed project may require dewatering and relocation of salmon and steelhead in the project site during construction periods during the summer months. Work areas within the stream channel will be dewatered using sandbags, gravel, and plastic to bypass surface stream flow. Salmonids will be seined and netted from the dewatered areas and relocated to an appropriate stream reach that will minimize impacts to captured fish and to fish that are residing at the release site. Fish relocation activities may injure or kill rearing juvenile salmon and steelhead because of the associated risk that collecting poses to fish, including stress, disease transmission, injury, or death (Hayes 1983). The amount of injury and mortality attributable to fish capture varies widely depending on the method used, the ambient conditions, and the expertise and experience of the field crew. The effects of seining and dip-netting on juvenile salmonids include stress, scale loss, physical damage, suffocation, and desiccation. Electrofishing can kill juvenile salmonids, and researchers have found serious sublethal effects including spinal injuries (Nielsen 1998, Nordwall 1999). Given current relocation techniques and protocols used to conduct the fish relocation, unintentional mortality of listed juvenile steelhead and salmon expected from capture and handling procedures is not likely to exceed 3 percent. Mortality from these activities can be reduced to near 1 percent with increased skill and experience of the operator, and field crew conducting the work.

Although sites selected for relocating fish will likely have similar water temperature as the capture site and should have ample habitat, in some instances relocated fish may endure short-term stress from crowding at the relocation sites. Relocated fish may also have to compete with other salmonids, native and non-native fishes which can increase competition for available resources such as food and habitat. Some of the fish at the relocation sites may move from these areas and may reside either upstream or downstream to areas that have more suitable habitat and lower fish densities. As each fish moves, competition is expected to remain localized to a small area or quickly diminish as fish disperse.

Most of the take associated with fish relocation is anticipated to be non-lethal, however, a very low number of rearing juvenile (mostly young of the year) salmon and steelhead captured may be injured or die. In addition, the number of fish affected by increased competition is not expected to be significant at most fish relocation sites, based upon the suspected low number of relocated fish inhabiting the small project areas. Low numbers of juvenile Chinook salmon are expected to be rearing in the action area during the summer period. Most juvenile Chinook salmon migrate to estuarine or the ocean environment by June 15th of each year, but in some cases small numbers of juvenile Chinook salmon may be encountered during fish relocation.

Therefore, fish relocation efforts will encounter very few salmon, low densities of juvenile steelhead, and other native and non-native species commonly found in the Russian River.

Effects associated with fish relocation activities are expected to be significantly reduced by implementing measures to reduce stress and potential for injury or death (J. Scriven, personal communication 2018). NMFS expects that fish relocation activities associated with this action will not significantly reduce the number of returning listed salmonid adults. Fish relocation activities will occur during the summer low-flow period after emigrating smolts have migrated from the proposed project site and before adult fish travel upstream to spawn. Therefore, the majority of listed salmonids that will be captured will be juvenile steelhead, generally young of the year and one-year age classes. Although most mortalities of salmon and/or steelhead during relocation activities will occur almost exclusively at the young of the year stage, there is a potential of unintentional mortality of older age-class fish.

Any fish residing within the stream reach the following fall and affected by the turbidity will likely experience short-lived, sub-lethal behavioral impacts (*e.g.*, reduced feeding efficiency). These short-term turbidity impacts, likely lasting a couple to several hours, are not expected to reduce fish growth as feeding behaviors will quickly resume after the pulse of turbidity.

The expected habitat loss will impact Chinook salmon and steelhead fitness and survival at the individual level, but not and at the population level. Fish migrating, spawning, or rearing within the action area along the proposed stabilization site will experience degraded aquatic habitat caused by the Project for varying durations. The time period during which adult and/or juvenile fish are exposed to elevated turbidity resulting from instream construction will likely be short, approximately several hours. Moreover, the level of turbidity will likely be slightly above background levels and well below levels found to injure or kill salmonids; impacted fish will more likely experience short-term behavioral effects, such as being forced to relocate to avoid the elevated turbidity, or experiencing reduced feeding efficiency if remaining in the turbid area. Fish that relocate away from the turbid area will likely experience greater feeding efficiency than those fish that remain, but this greater efficiency will likely be tempered by increased competition, as fish densities rise within refugia areas. Whether relocating or remaining within the action area, the turbidity impacts experienced by affected fish will likely be discountable, given the expected low turbidity levels and short impact duration resulting from the Project.

By comparison, fish response to impacts resulting from the proposed bank stabilization will be much longer in duration. While turbidity impacts will be ephemeral in nature and likely have minor impacts on long-term fish population viability or persistence, the rip-rap structure, and its resulting effect on natural channel-evolution processes and instream habitat, are expected to last well into the future -- at least several decades. Thus, for species with typically short life-spans (2-6 years for Chinook, 3-4 years for steelhead), the Project will impact individual fish within the project site and is unlikely to cause population-level impacts over time. The long-term impacts from bank stabilization may lead to decreased productivity and abundance of salmonid populations in the action area over successive generations. In effect, the proposed bank stabilization will perpetuate the diminished carrying capacity that currently exists within the action area reach.

2.5.2 Impacts to Critical Habitat

The West Fork Russian is designated critical habitat for CCC coho salmon, CC Chinook salmon and CCC steelhead. In general, physical and biological features of critical habitat for both coho salmon and steelhead found within the action area include sites for migration, spawning, and rearing. Effects of the Project on designated critical habitat include elevated turbidity, streambank and floodplain habitat degradation, and precluding natural fluvial and geomorphic channel dynamics.

The applicant proposes to place large rip-rap (i.e. boulders) over the exposed streambank, while utilizing bio-engineering techniques of willow sprig planting through the riprap and large woody debris (LWD) embedded below the ordinary high-water line. Just above the rip-rap, the applicant will install a shotcrete wall to further arrest bank erosion and protect existing property. In order to place the rip-rap armoring onto the streambank, heavy machinery will dig within the streambank for access to the site and disrupt the streambed to excavate a toe trench for placing rip-rap and LWD. The proposed disturbance of the site is likely dislodging previously armored and sequestered inter-gravel fine sediment and allowing it to be mobilized and transported downstream when the action area re-waters the following fall.

Studies of sediment effects from culvert construction determined that the level of sediment accumulation within the streambed returned to control levels between 358 to 1,442 meters downstream of the culvert (LaChance et al. 2008). Compared to the sediment impact of a culvert replacement, which often involve disturbing a significant volume of road fill, the excavation of the area of mixed grain size substrate at the toe of the stabilized slope (1,100 feet in length) proposed by this project will likely result in a moderate turbidity response. Thus, sediment effects from the proposed bank stabilization are expected to extend downstream within the action area for a distance downstream approximately 1,700 feet (518 meters) within the range presented by LaChance et al. (2008), likely no further than 1,700 feet below the project site, where the West Fork Russian converges with Forsythe Creek.

Turbidity pulses during the first fall rains may slightly degrade the value of critical habitat in the action area, but only temporarily. Based on the size of the area disturbed and stream and bank substrate conditions, NMFS expects turbidity during the first fall rains to last for only a few hours, given the proposed measures by the applicant to minimize sediment delivery from the site. Minimization measures are expected to reduce the duration, and quantity of sediment deposited downstream, and is unlikely to have a substantial impact on rearing, spawning, or migration habitat in the action area.

Of greater concern than short-term turbidity pulses is the long-term preclusion of natural fluvial and geomorphic processes that will likely result from the Project. Streams transport water and sediment from upland sources to the ocean and, generally speaking, the faster the streamflow, the greater the erosive force. Natural processes constrain and moderate these erosive forces, such as when complex structure both within (e.g., boulders or woody debris) and adjacent (e.g., riparian vegetation) to the stream channel slows the water velocity and, by extension, its erosive force (Knighton 1998). Where existing geology and geomorphology allow, such as within the action area , a stream channel will also naturally “meander”, eroding laterally to dissipate its hydraulic energy while creating a sinuous longitudinal course. Stream meandering efficiently regulates the erosive forces by lengthening the channel and reducing stream gradient, thus controlling the ability of the stream to entrain and transport available sediment. Meandering streams also create and maintain both the hydraulic and physical components of instream habitat used by fish and other aquatic species. For instance, specific to salmon and steelhead, a meandering, unconstrained stream channel sorts and deposits gravel and other substrate necessary for optimal food production and spawning success, maintains a healthy and diverse riparian corridor that supplies LWD, and allows floodplain engagement during appropriate winter flows (Spence et al. 1996).

By design, streambank stabilization projects prevent lateral channel migration, effectively forcing streams into a simplified linear configuration that, without the ability to move laterally, instead erode and deepen vertically (Leopold et al. 1968; Dunn and Leopold 1978). The resulting "incised" channel fails to create and maintain aquatic and riparian habitat through lateral migration, and can instead impair groundwater/stream flow connectivity and repress floodplain and riparian habitat function. The resulting simplified stream reach typically produces limited macroinvertebrate prey and poor functional habitat for rearing juvenile salmonids (Florsheim et al. 2008). Because bank stabilization utilizing rip-rap is typically designed to withstand high streamflow caused by large storm events, the rip-rap structure, and by extension the impacts to instream habitat, are in effect everlasting, harming future fish generations well into the future. Moreover, streambank stabilization impacts not only extend temporally; altered geomorphic and hydraulic processes can propagate spatially both upstream and downstream of hardened bank structures, dependent upon site- and structure-specific characteristics (Henderson 1986 and Arnaud-Fassetta et al. 2005, as cited in Florsheim et al. 2008), meaning that "bank stabilization often begets more bank stabilization." Finally, rip-rap as a stabilization material immediately and permanently replaces a natural earthen streambank, which can provide complex fish habitat (e.g., undercut banks, submerged rootwads, etc.) (Fischenich and Copeland 2001), with a relatively simple, homogenous streambank structure less suitable for juvenile salmon and steelhead (Schmetterling et al. 2001; Fischenich 2003).

The Tribe proposes to install complex LWD within the structure below the ordinary high-water level in order to improve habitat complexity and thwart future channel incision. Nevertheless, by stabilizing a 1,100-foot length of the streambank with rock rip-rap will increase in-channel velocities during the 5 year and 50-year storm events as reported by Garcia & Associates (2017). Therefore, the Project will likely compromise the value of available critical habitat in the action area for spawning, migrating, and rearing, by precluding natural fluvial and geomorphic processes within the action area for the foreseeable future.

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.

CC Chinook salmon status remains as threatened (NMFS 2016) due to the continuing threats that face this species such as poor ocean conditions, drought and reduced fresh water habitat quality. Throughout the ESU there has been a mix in population trends, with some population abundance increasing and others decreasing (NMFS 2016). 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, Spence 2016). The minor loss of Chinook salmon habitat along the West Fork Russian River is unlikely to reduce the overall abundance of the Chinook salmon population in Russian River. Monitoring by the Sonoma County Water Agency from 2000-2013 has documented an average of approximately 3,000 adult spawners annually, with the highest abundance seen in 2012 of almost 7,000 spawners (NMFS 2016). These spawners utilize much of the mainstem Russian River and its larger tributaries for spawning and rearing. The reduction, in habitat quality along approximately 1/3 of a mile of habitat (action area) is expected to reduce spawning or rearing success of a small number of Russian River Chinook salmon. Given the current population abundance in the Russian River, the loss of a few individual juvenile fish is not expected to be sufficient to increase the extinction risk of this population, and therefore would not change the trajectory of this species at the ESU level.

The West Fork Russian River is part of the Upper Russian River "independent" population, and serves an essential role in CCC steelhead recovery efforts (NMFS 2016). As with Chinook salmon, a small number of steelhead inhabiting the action area will experience a higher likelihood of perishing prior to reaching adulthood and spawning, primarily due to reduced fitness and growth brought about by the proposed bank stabilization project construction and its negative impact on instream habitat. However, the anticipated small loss of juvenile steelhead is unlikely to appreciably impact the future survival and recovery at the population or DPS scale, since adequate quantities of habitat remain within the tributary reaches of the West Fork Russian River from which the lost production can be regained.

Global climate change presents another real threat to the long-term persistence of CC Chinook salmon and CCC 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, reinforcing the likelihood of reduced carrying capacity in the action area due to bank stabilization as described above.

The proposed action will degrade PBFs and essential habitat types in the action area, namely those related to juvenile rearing. 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, CC Chinook, ESU or CCC steelhead DPS, given the small area being degraded compared to the quality and quantity of habitat within the Russian 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, CC Chinook and CCC steelhead at the ESU and DPS level.

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 action, any effects of other activities, and cumulative effects, it is NMFS' biological opinion that the action is unlikely to jeopardize the continued existence of CC Chinook salmon, and CCC steelhead or destroy or adversely modify its designated critical habitat for CCC coho salmon, CC Chinook salmon or CCC steelhead.

2.9. Incidental Take Statement

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

2.9.1. Amount or Extent of Take

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

NMFS expects the proposed project will result in incidental take of listed CC Chinook salmon, and CCC steelhead during two construction seasons. Juvenile steelhead and to a lesser magnitude juvenile Chinook salmon will be harmed, injured, or killed from the dewatering and fish relocating activities at the project site. Specifically, incidental take is expected to be in the form of capture during dewatering and fish relocation activities. NMFS expects no more than 3 percent of the juvenile salmon and steelhead captured will be injured or killed during each construction season.

Also, take in the form of reduce fitness of some individual fish within the action area is expected. However, quantifying the number of fish impacted is difficult, given the complex and variable components at play. Individual fish behavior, and how that behavior adapts to evolving habitat conditions, will primarily influence how many fish will be impacted by the Project, and to what degree. In this circumstance, NMFS cannot provide an amount of take that would be caused by the proposed action. In instances such as this, NMFS designates the expected level of take in terms of the extent of take anticipated. Here, the best available indicator for the extent of take is related to the area of habitat lost due to streambank rip-rap armoring at the Project site. This variable is directly proportional to extent and nature of harm attributable to this project.

Therefore, for harm associated with permanent placement of rock armor along the West Fork Russian River, the linear length of streambank covered by rip-rap rock armor will serve as an effective take indicator. Specifically, the anticipated take will be exceeded if the total distance of rip-rap rock armor placement is longer than 1100 feet. Likewise, anticipated take will be exceeded if the amount, size and type of LWD and willow cuttings as proposed within the final project design, are not incorporated into the constructed Project. This take indicator operates as an effective reinitiation trigger because the Corps has authority to conduct compliance inspections and to take actions to address noncompliance, including post-construction (33 CFR 326.4).

2.9.2. Effect of the Take

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

2.9.3. Reasonable and Prudent Measures

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

NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of CC Chinook salmon or CCC steelhead:

1. Measures shall be taken to minimize the amount or extent of incidental take of listed salmonids resulting from fish relocation, dewatering, or instream construction activities.

2. Minimize incidental take caused by the rip-rap streambank stabilization by ensuring riparian plantings survive and successfully revegetate the streambank.

3. Ensure completion of a monitoring and reporting program to confirm that the take exemption for the proposed action is not exceeded, and that the terms and conditions in this incidental take statement are effective in minimizing incidental take.

2.9.4. Terms and Conditions

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

1. The following Terms and Conditions implement Reasonable and Prudent Measure 1:

   a. The applicant 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 be qualified to conduct fish collections in a manner which minimizes all potential risks to ESA-listed salmonids. Electrofishing, if used, shall be performed by a qualified biologist and conducted according to the *NOAA Fisheries Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act*, June 2000.

   b. The fisheries biologist shall monitor the construction site during placement and removal of cofferdams 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 staff at 707 575-6050, 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 fish 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 or DFW) where suitable habitat conditions are present to allow for survival of transported fish and in anadromous waters.

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.

e. Pumps used to dewater the work area shall be equipped with screens that meet the following NMFS fish screening criteria:

   i. Perforated plate: screen openings shall not exceed 3/32 inches (2.38mm), measured in diameter.
   ii. Woven Wire: screen openings shall not exceed 3/32 inches (2.38 mm measured diagonally).
   iii. Screen material shall provide a minimum of 27% open area.
   iv. Approach velocity shall not exceed 0.33 feet per second.

2. The following Terms and Conditions implement Reasonable and Prudent Measure 2:
   a. The applicant prepares a vegetation monitoring plan to ensure establishment of streambank vegetation so that the streambank area functions at its maximum potential. Vegetation monitoring plan shall be submitted within 60 days of Project conclusion.
   b. Send plans and reports to:

      NMFS Santa Rosa
      Attn: North Coast Branch Supervisor
      777 Sonoma Avenue, Room 325
      Santa Rosa, California 95404.

3. The following Terms and Conditions implement Reasonable and Prudent Measure 3:
   a. Implementation Monitoring Report Required. The permittee shall submit an implementation monitoring report to NMFS, at the address above, within 60 days of completing all construction work for each construction season.

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).

1. NMFS recommends the Corps have the applicant purchase conservation bank credits at a NMFS-approved conservation bank for the following: (1) permanent loss of natural streambank and channel processes; and (2) temporary loss of cover and forage habitat due to rip-rap armoring.

2.11. Reinitiation of Consultation

This concludes formal consultation for the reinitiation of the West Fork Russian River Bank Stabilization 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)].

3.1. Essential Fish Habitat Affected by the Project

This analysis is based, in part, on the EFH assessment provided by the Corps and descriptions of EFH for Pacific coast salmon (PFMC 2014). Pacific coast salmon EFH may be adversely affected by the proposed action. Specific habitats identified in 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. HACPs for coho salmon and Chinook salmon include all waters, substrates and associated biological communities falling within the critical habitat areas described above in the accompanying Biological Opinion for the bank stabilization project located on the West Fork Russian River. Essentially, all CC Chinook salmon and CCC coho salmon habitat located within the proposed action is considered HACP as defined in PFMC (2014).

3.2. Adverse Effects on Essential Fish Habitat

NMFS has evaluated the proposed project for potential adverse effects to EFH pursuant to Section 305(b)(2) of the MSFCMA. As described and analyzed in the accompanying BO, NMFS anticipates some short-term sediment impacts will occur at the project location. Increased fine sediment could further degrade already degraded habitat conditions in the action area. The duration and magnitude of direct effects to EFH associated with the proposed bank stabilization work will be minimized from proposed design and project specific mitigation measures implemented during project execution.

3.3. Essential Fish Habitat Conservation Recommendations

NMFS determined that the following conservation recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the impact of the proposed action on EFH. Although short-term potential adverse effects anticipated as a result of project activities, the proposed minimization and avoidance measures in the accompanying BO are sufficient to avoid, minimize and/or mitigate for the anticipated affects. Therefore, no EFH additional Conservation Recommendations are necessary at this time otherwise offset the adverse effects to EFH.

3.4. Supplemental Consultation

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

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

4.1. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the Corps. Other interested users could include the Applicant. Individual copies of this opinion were provided to the Corps. The document will be available within 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adheres to conventional standards for style.

4.2. Integrity

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

4.3. Objectivity

Information Product Category: Natural Resource Plan

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