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

January 22, 2020 **Refer to NMFS No:** WCRO-2019-01665

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

Re: Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Elk River Sediment Remediation and Habitat Rehabilitation Project in Humboldt County, California (Corps File No. 2018-00169N)

Dear Mr. Mazza:

Thank you for your letter of June 17, 2019, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Elk River Sediment Remediation and Habitat Rehabilitation Project. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402, 84 FR 45016). Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA)(16 U.S.C. 1855(b)) for this action. This letter transmits NMFS' final biological opinion and EFH response for the proposed Elk River Sediment Remediation and Habitat Rehabilitation Project (Project).

The enclosed biological opinion describes NMFS' analysis of effects on threatened Southern Oregon/Northern California Coast (SONCC) coho salmon *(Oncorhynchus kisutch)*, California Coastal (CC) Chinook salmon *(O. tshawytscha)*, Northern California (NC) steelhead *(O. mykiss),* and their designated critical habitat in accordance with section 7 of the ESA. Based on the best scientific and commercial information available, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of SONCC coho salmon, CC Chinook salmon, and NC steelhead, nor is the project likely to destroy or adversely modify designated critical habitat for these species. NMFS expects the proposed action would result in incidental take of SONCC coho salmon, CC Chinook salmon, and NC steelhead. An incidental take statement with non-discretionary terms and conditions is included with the enclosed biological opinion.

The enclosed EFH consultation was prepared pursuant to section 305(b) of the MSA. The proposed action includes areas identified as EFH for coho salmon and Chinook salmon, Pacific Salmon species managed under the Pacific Coast Salmon Fishery Management Plan. Based on our analysis, NMFS concludes that the project would adversely affect EFH for coho salmon and Chinook salmon and we have identified one EFH Conservation Recommendation.

Please contact Matt Goldsworthy, Northern California Office, Arcata, at (707) 825-1621 or via email at Matt.Goldsworthy@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: ARN File #151422WCR2019AR00144

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

Elk River Sediment Remediation and Habitat Rehabilitation Project
Humboldt County, California

NMFS Consultation Number: WCRO-2019-01665

Action Agency: United States Army Corps of Engineers, San Francisco District

Table 1. Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Southern Oregon/North California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*)	Threatened	Yes	No	No
California Coastal (CC) Chinook salmon (*O. tshawytscha*)	Threatened	Yes	No	No
Northern California (NC) Steelhead (*O. mykiss*)	Threatened	Yes	No	No

Table 2. Essential Fish Habitat and NMFS' Determinations:

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes

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

Issued By:

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Date: January 22, 2020

Table of Contents

1 INTRODUCTION

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

1.1 Background

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

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on October 28, 2019 [84 FR 44976]. This consultation was pending at that time, and we are applying the updated regulations to the consultation. As the preamble to the final rule adopting the regulations noted, "[t]his final rule does not lower or raise the bar on section 7 consultations, and it does not alter what is required or analyzed during a consultation. Instead, it improves clarity and consistency, streamlines consultations, and codifies existing practice." We have reviewed the information and analyses relied upon to complete this biological opinion in light of the updated regulations and conclude the biological opinion is fully consistent with the updated regulations.

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 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). A complete record of this consultation is on file at the NMFS Northern California Office in Arcata, California.

1.2 Consultation History

Between December 19, 2017, and September 5, 2018, there were several meetings and a site visit to evaluate the Project's 65% engineering designs in the field. Both the California Department of Fish and Wildlife (CDFW) and NMFS raised concerns about the scale, reductions of riparian vegetation, and the amount of harm to fish from the proposal. In response to concerns raised, the Project was substantially revised and scaled down. The changes to the Project included a reduction of approximately 900 feet of in-channel treatments (dredging or sediment remediation treatments); elimination of five floodplain excavations; elimination of three spoil sites; and incorporation of woody debris as part of the proposed mitigation for California Endangered Species Act (CESA) requirements.

On June 17, 2019, NMFS received the Corps' request to initiate formal ESA consultation on the Project for the proposed issuance of a Clean Water Act Section 404 permit for the Elk River Sediment Remediation and Habitat Rehabilitation Project. The Corps determined that the Project

may adversely affect Southern Oregon/Northern California Coast (SONCC) coho salmon, California Coastal (CC) Chinook salmon and Northern California (NC) steelhead, and their designated critical habitats. The Corps also requested initiation of MSA EFH consultation.

On July 1, 2019, NMFS requested clarification via email to the Corps regarding the duration of the permit, additional information on the extent of effects in the environment, and the proposed monitoring planned. On July 1, 2019, both the Corps and Applicant responded via email that the permit duration would be five years, additional information on extent of effects in the environment was provided, and it was confirmed that only physical habitat-based monitoring was planned, there would be no capture of salmonids associated with the monitoring. The consultation was initiated on July 1, 2019. On July 1, 2019, the CDFW and NMFS requested information from the Project Team regarding the CESA Federal Consistency Determination (CD). On September 13, 2019, the Project Team provided via email, information required in order to support a CESA CD.

On January 6, 2020, NMFS requested clarification via email to the Corps and Applicant regarding the proposed work schedule and timing of implementation of both the Wrigley Orchard Reach and Flood Curve Reach. On January 6, 2020, the Applicant confirmed via email that the Wrigley Orchard Reach was expected to be implemented during summer 2020 and the Flood Curve Reach is not expected to be implemented until 2021 or subsequent seasons if funding can be acquired.

1.3 Proposed Federal Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). For EFH consultation, 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).

The Corps proposes to issue a 5-year permit pursuant to Section 404 of the Clean Water Act to Caltrout (the Applicant) to conduct activities to begin to remediate excessive fine sediment, nuisance flooding, loss of water quality, and degraded juvenile salmonid rearing habitat by excavating up to 22,000 cubic yards of sediment from the bed and banks of the North Fork Elk River within the Project area to re-create a more natural channel form and salmonid habitat. The Project objectives are to reduce the frequency and duration of flooding; reconstruct a channel morphology with pool-riffle sequences containing fine gravel-beds in the riffles and large wood in deep pools; improve dissolved oxygen concentrations during the summer; and maintain or avoid impacts to riparian habitat and private property. There are two primary work areas: the Wrigley Orchard Reach and the Flood Curve Reach. The Wrigley Orchard Reach is expected to be implemented during the 2020 construction season. The Wrigley Orchard Reach is being implemented first so that lessons learned during implementation, such as excavation techniques, can be applied to the larger Flood Curve Reach. The Flood Curve Reach will not be implemented until the 2021 construction season at the earliest, and may not be implemented until funding is acquired.

1.3.1 Project Description

Heavy equipment work will be conducted during the dry season from August 15 to October 15. Temporary access roads will be constructed in order to access portions of the channel to be treated. Fish exclusion screens and temporary cofferdams will be placed at the upstream and downstream boundaries of the project reaches, and fish will be captured and relocated to other reaches of the North Fork and South Fork Elk River. The streamflow will be pumped or bypassed around the project reaches to temporarily dewater the channel during construction. Excavators, dump trucks, and other heavy equipment will be used to remove large wood pieces and live vegetation from the channel bed and banks, then excavate excess sediment from the channel bed and banks to meet engineering design elevations for a modified channel. Sediment will be hauled to designated spoil areas and erosion control features and riparian re-vegetation will occur in the floodplain disturbance areas. Riffle crests will be constructed by incorporating a 6-12 inch layer of pea gravel (3/8 inch size).

To fulfill mitigation requirements under CESA, the applicant proposes to include the installation of at least one large wood structure into each pool excavated in the project reaches after fine sediments are removed. These wood structures are intended to provide coho salmon with low or zero velocity habitat refugia to improve winter rearing habitat. The wood structures consist of a total of 48 pieces of wood (six pieces of wood for each of the eight wood structures). This habitat enhancement action would be monitored by the applicant for up to 5 years after completion of construction to ensure satisfactory project performance. To ensure that the CESA mitigation component of the Project is adequately funded, Caltrout has provided an estimate that the financial assurances provided to CDFW would be $68,400, which includes the performance monitoring activities that are associated with the wood structures.

1.3.2 Wrigley Orchard Reach

The Project's objectives for the Wrigley orchard Reach (WOR) include enhancement of winter and summer juvenile rearing conditions; evaluation of the efficacy of an enlarged channel to transport sediment and reduce localized aggradation rates; improving low dissolved oxygen levels during the summer; and monitoring annual aggradation in the reconstructed channel. Implementation and construction in the WOR is expected to occur during the 2020 construction season (August 15 – October 15). There will be 375 feet of channel dewatered, where sediments will be dredged to achieve the desired design elevations (Caltrout 2019). The WOR component of the Project will employ techniques such as dredging, vegetation management, and creation of inset floodplains in order to test the efficacy of enlarged channels and to monitor the rate of refilling after dredging is complete. The WOR will integrate one or two large wood structures and increase pool depths to greater than 4-5 feet deep. Each large wood structure would contain approximately four to six redwood logs, with one log anchored and buried into the bank, and be enhanced with smaller salvaged wood. Approximately 600 cy of sediment will be dredged from 200 feet of channel along with approximately 2,100 cy of sediment to create an inset floodplain adjacent to the channel along the right bank.

1.3.3 Flood Curve Reach

The Project's objectives for the Flood Curve Reach (FCR) include enhancement of winter and summer juvenile rearing conditions; increasing the sediment transport capacity during winter storms; reducing the frequency and duration of nuisance flooding; improving dissolved oxygen

in the summer; and monitoring annual aggradation in the reconstructed channel. Implementation and construction in the WOR is expected to occur during the 2020 construction season (August 15 – October 15). There will be 2,000 feet of channel dewatered, where sediments will subsequently be excavated and removed to achieve the desired design elevations (Caltrout 2019). The FCR will construct seven pool and riffle sequences, which include the following design details: gravels will be imported and added to seven riffles; large wood structures will be added to seven pools; pools will be dredged to provide pools deeper than 4-5 feet; and portions of the floodplain will be lowered. Approximately 14,800 to 17,300 cy of sediment will be dredged from the channel along with 3,100 cy to create an inset floodplain on the right bank. The banks of the channel will be constructed to achieve a slope that will not exceed 1.5:1 ratio. The seven large wood structures will consist of at least one key piece (18-24 inch diameter by 20-30ft long, preferably with attached rootwad), an equally sized footer log, two anchor logs (12-18 inch diameter) and two smaller pinning logs (>12 inch diameter), for a total of six wood pieces.

1.3.4 Fish Relocation and Dewatering

Fish relocation will involve multiple steps, beginning with the least invasive approach (minnow traps and seining) and progressing to more invasive methods (electrofishing after aquatic habitat in the work areas is isolated) to ensure most of the aquatic organisms are relocated out of the work areas. Approximately three weeks prior to heavy equipment work, fish screens will be installed at riffle crests upstream and downstream of the reaches planned to be dewatered (one reach at the WOR and one reach at FCR). Minnow traps will be baited with salmon roe and set approximately 100 feet apart within the work areas and checked every 20-minutes. Minnow trapping will continue for several days until captures diminish.

Small woody debris, loose vegetation, and other impediments will be removed to accommodate efficient seining effort after minnow trapping efforts have reduced the densities of fish in the work area. Seining will be conducted in an upstream direction and may consist of one or two passes through the entire reach. After seining, at least one pass through the entire reach will be conducted using an electrofisher backpack unit.

Fish will be placed into five gallon buckets and if water temperatures are above 63 degrees Fahrenheit, ice blocks are proposed to be added to buckets. Fish will not be overcrowded into buckets and predatory animals such as large sculpins or coastal giant salamanders will not be placed into buckets with smaller organisms. All captured fish will be transported to the relocation areas in the North Fork and South Fork of Elk River within 15-30 minutes.

Upon completion of all fish relocation activities, cofferdams will be installed and water that begins to pond upstream of the cofferdam will be diverted and routed into a storage tank where sediments are expected to settle out. The water will be returned to the channel downstream of the downstream-most cofferdam. Trash pumps with screens will be used to dewater the work areas and turbid waters may be pumped from work sites and allowed to settle in stable locations upslope.

1.3.5 Revegetation and Erosion Control

Approximately 3.42 acres of riparian and coniferous forest will be removed from within the active channel, along the current banks of the channel, and outside the channel to accommodate construction and placement of the wider channel dimensions. Of the 3.42 acres of vegetation

affected, 1.15 acres will be replanted at a 3:1 ratio. Of this amount, 0.73 acres are proposed to be converted from a riparian species composition (willow and alder) to conifer species. Revegetation will occur across a variety of habitat types and will include hydroseed, chipped mulch, and riparian vegetation plantings. Access ramps will be removed and the disturbed areas recontoured. The Applicant will mark and flag all plants and trees that are planted as part of the revegetation plan to accommodate monitoring for 80% success or survival rate.

All disturbed surfaces will be treated to minimize subsequent erosion during rain events, with the exception of the disturbed areas that occur within the channel. Spoils will be treated for erosion control using native grass seed in riparian and wetland areas and mulched with at least 2-4 inches of certified weed free straw mulch. Upland areas will be mulched with rice straw. Silt fences and other methods may also be used to control erosion.

1.3.6 Monitoring

As-built and performance monitoring will occur for at least three years following the completion of construction activities. This monitoring will include post-construction as-built surveys, winter monitoring of water surface elevations and channel cross section responses to winter high flow events, and monitoring of salmonid habitat conditions through the spring recession into the summer low-flow period. As-built monitoring is intended to evaluate conformance of the constructed channel and floodplain elevations with the engineering design; conformance with the revegetation plan; and for monitoring photo-monitoring points.

Geomoprhic and sediment responses will be monitored for one winter and spring season following construction to document the channel and sediment conditions after one winter. Longitudinal profiles of the reconstructed channels, cross sectional surveys, water surface elevation monitoring during one or two large storm events; sediment content and characterization mapping; and mapping and inventorying wood structures and pieces. Pool depths, water temperatures, dissolved oxygen, wood structure effectiveness, and persistence of the placed gravel riffle beds will be monitored during the summer following construction to evaluate fish habitat changes.

1.3.7 Other Activities

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

2 ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

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

that specifies the impact of any incidental taking and includes non-discretionary 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 "to jeopardize the continued existence of" a listed species, which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02). The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The 2016 critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The 2019 regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the regulations (84 FR 44977), that definition does not change the scope of our analysis and in this opinion we use the terms "effects" and "consequences" interchangeably.

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

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

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. 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 current function of the essential PBFs that help to form that conservation value.

2.2.1 Species Description and General Life History

2.2.1.1 SONCC Coho Salmon

Coho salmon have a generally simple 3-year life history. The adults typically migrate from the ocean and into bays and estuaries towards their freshwater spawning grounds in late summer and fall, and spawn by mid-winter. Adults die after spawning. The eggs are buried in nests, called redds, in the rivers and streams where the adults spawn. The eggs incubate in the gravel until fish hatch and emerge from the gravel the following spring as fry. These 0+ age fish typically rear in freshwater for about 15 months before migrating to the ocean. The juveniles go through a physiological change during the transition from fresh to salt water called smoltification. Coho salmon smolts typically outmigrate between March and July (Ricker et al. 2014). Coho salmon typically rear in the ocean for two growing seasons, returning to their natal streams as 3-year-old fish to renew the cycle.

2.2.1.2 CC Chinook Salmon

CC Chinook salmon are typically fall spawners, returning to bays and estuaries before entering their natal streams in the early fall. The adults tend to spawn in the mainstem or larger tributaries of rivers. As with the other anadromous salmon, the eggs are deposited in redds for incubation. When the 0+ age fish emerge from the gravel in the spring, they typically migrate to saltwater shortly after emergence. Therefore, Chinook salmon typically enter the estuary as smaller fish compared to coho salmon. Chinook salmon are typically present in the stream-estuary ecotone, which is located in the downstream portions of major tributaries to estuaries like Humboldt Bay, from early May to early September, with peak abundance in June/July (Wallace and Allen 2007). Similar to coho salmon, prey resources during out-migration are critical to Chinook salmon survival as they grow and move out to the open ocean.

2.2.1.3 NC Steelhead

Steelhead exhibit the most complex suite of life history strategies of any salmonid species. They have both anadromous (ESA listed) and resident freshwater (not ESA listed) life histories that can be expressed by individuals in the same watershed. The anadromous fish generally return to freshwater to spawn as 4 or 5 year old adults. Unlike other Pacific salmonids, steelhead can survive spawning and return to the ocean only to return to spawn in a future year. It is rare for steelhead to survive more than two spawning cycles. Steelhead typically spawn between December and May. Like other Pacific salmonids, the steelhead female deposits her eggs in a

redd for incubation. The 0+ age fish emerge from the gravel to begin their freshwater life stage and can rear in their natal stream for 1 to 4 years before migrating to the ocean.

Steelhead have a similar life history as noted above for coho salmon, in the sense that they rear in freshwater for an extended period before migrating to saltwater. As such, they enter the estuary as larger fish (mean size of about 170 to 180 mm or 6.5 to 7.0 inches) and are, therefore, more oriented to deeper water channels in contrast to Chinook salmon that typically enter the estuary as 0+ fish. CDFW data indicate that steelhead smolts generally migrate downstream toward the estuary between March 1 and July 1 each year, although they have been observed as late as September (Ricker et al. 2014). The peak of the outmigration timing varies from year to year within this range, and generally falls between early April and mid-May.

2.2.2 Status of Species and Critical Habitat

In this biological opinion, NMFS assesses four population viability parameters to help us understand the status of each species and their ability to survive and recover. These population viability parameters are: abundance, population productivity, 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 Recovery Plan for SONCC Coho Salmon (NMFS 2014) and Coastal Multispecies Recovery Plan (NMFS 2016), to determine the general condition of each population and factors responsible for the current status of each Distinct Population Segment (DPS) or Evolutionarily Significant Unit (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 402.02).

2.2.2.1 Status of SONCC Coho Salmon

SONCC Coho Salmon Abundance and Productivity: Although long-term data on coho salmon abundance are scarce, the available evidence from short-term research and monitoring efforts indicate that spawner abundance has declined since the last status review for populations in this ESU (Williams et al. 2016). In fact, 24 of the 31 independent populations in the ESU are at high risk of extinction because they are below or likely below their depensation threshold, which can be thought of as the minimum number of adults needed for survival of a population. No populations are at a low risk of extinction and all core populations are thousands short of the numbers needed for recovery (Williams et al. 2016).

SONCC Coho Salmon Spatial Structure and Diversity: The distribution of SONCC coho salmon within the ESU is reduced and fragmented, as evidenced by an increasing number of previously occupied streams from which SONCC coho salmon are now absent (NMFS 2001, Good et al. 2005, Williams et al. 2011, Williams et al. 2016). Extant populations can still be found in all major river basins within the ESU (70 FR 37160; June 28, 2005). However, extirpations, loss of brood years, and sharp declines in abundance (in some cases to zero) of SONCC coho salmon in several streams throughout the ESU indicate that the SONCC coho salmon's spatial structure is more fragmented at the population-level than at the ESU scale. The genetic and life history diversity of populations of SONCC coho salmon is likely very low. The SONCC coho salmon ESU is currently considered likely to become endangered within the foreseeable future in all or a significant portion of its range, and there is heightened risk to the persistence of the ESU as VSP

parameters continue to decline and no improvements have been noted since the previous status review in 2011 (Williams et al. 2016).

2.2.2.2 Status of CC Chinook Salmon

CC Chinook Salmon Abundance and Productivity: Low abundance, generally negative trends in abundance, reduced distribution, and profound uncertainty as to risk related to the relative lack of population monitoring in California have contributed to NMFS' conclusion that CC Chinook salmon are likely to become an endangered species within the foreseeable future throughout all or a significant portion of their range. Where monitoring has occurred, Good et al. (2005) found that historical and current information indicates that CC Chinook salmon populations are depressed. Uncertainty about abundance and natural productivity, and reduced distribution are among the risks facing this ESU. Concerns regarding the lack of population-level estimates of abundance, the loss of populations from one diversity stratum[1], as well as poor ocean survival contributed to the conclusion that CC Chinook salmon are likely to become an endangered species in the foreseeable future (Good et al. 2005, Williams et al. 2011, Williams et al. 2016).

CC Chinook Salmon Spatial Structure and Diversity: 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. (2016) concluded the extinction risk of the CC Chinook salmon ESU has not changed since the last status review. The genetic and life history diversity of populations of CC Chinook salmon is likely very low and is inadequate to contribute to a viable ESU, given the significant reductions in abundance and distribution.

2.2.2.3 Status of NC Steelhead

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

NC Steelhead Spatial Structure and Diversity: NC steelhead remain broadly distributed throughout their range, with the exception of habitat upstream of dams on both the Mad River and Eel River, which has reduced the extent of available habitat. Extant summer-run steelhead populations exist in Redwood Creek and the Mad, Eel (Middle Fork) and Mattole Rivers. The abundance of summer-run steelhead was considered "very low" in 1996 (Good et al. 2005), indicating that an important component of life history diversity in this DPS is at risk. Hatchery practices in this DPS have exposed the wild population to genetic introgression and the potential for deleterious interactions between native stock and introduced steelhead. However, abundance and productivity in this DPS are of most concern, relative to NC steelhead spatial structure and diversity (Williams et al. 2011).

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

2.2.2.4 Status of Critical Habitats

The condition of SONCC coho salmon, CC Chinook salmon, and NC steelhead 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 (Williams et al. 2016, Weitkamp et al. 1995). Diversion and storage of river and stream flow has dramatically altered the natural hydrologic cycle in many of the streams within the ESU's and DPS. Altered flow regimes can delay or preclude migration, dewater aquatic habitat, and strand fish in disconnected pools, while unscreened diversions can entrain juvenile fish.

2.2.3 Factors Responsible for the Decline of Species and Critical Habitat

The factors that caused declines of species and degradation of critical habitat include hatchery practices, ocean conditions, habitat loss due to dam building, degradation of freshwater habitats due to a variety of agricultural and forestry practices, water diversions, urbanization, over-fishing, mining, climate change, and severe flood events exacerbated by land use practices (Good et al. 2005, Williams et al. 2016). Sedimentation and loss of spawning gravels associated with poor forestry practices and road building are particularly chronic problems that can reduce the productivity of salmonid populations. Late 1980s and early 1990s droughts and unfavorable ocean conditions were identified as further likely causes of decreased abundance (Good et al. 2005). From 2014 through 2016, drought conditions in California reduced stream flows and increased temperatures, further exacerbating stress and disease. Ocean conditions have been unfavorable in past years due to the El Nino in 2015 and 2016 and other anomalously warm waters in the Gulf of Alaska. Reduced flows can cause increases in water temperature, resulting in increased heat stress to fish and thermal barriers to migration.

One factor affecting the range wide status and aquatic habitat at large is climate change. The best available information suggests that the earth's climate is warming, and that this could significantly impact ocean and freshwater habitat conditions, and thus the survival of species subject to this consultation. Recent evidence suggests that climate and weather is expected to become more extreme, with an increased frequency of drought and flooding (IPCC 2014). Climate change effects on stream temperatures within Northern California are already apparent. For example, in the Klamath River, Bartholow (2005) observed a 0.5°C per decade increase in water temperature since the early 1960's, and model simulations predict a further increase of 1-2°C over the next 50 years (Perry et al. 2011).

In coastal and estuarine ecosystems, the threats from climate change largely come in the form of sea level rise and the loss of coastal wetlands. Sea levels will likely rise exponentially over the next 100 years, with possibly a 50-80 cm rise by the end of the 21st century (IPCC 2014). This rise in sea level will alter the habitat in estuaries and either provides an increased opportunity for

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

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 approximately 2,875 feet of the North Fork Elk channel; 500 feet of the mainstem Elk River channel; 1.9 acres of adjacent floodplain areas; all construction, access roads, and staging areas; all sediment disposal areas; and the two fish relocation sites in the North Fork Elk River (5,280 feet of North Fork Elk downstream from Brown's Creek) and in the South Fork Elk River (5,280 feet of South Fork Elk upstream from Tom's Gulch). The action area described includes the 500 foot distance that Project-related turbidity is expected to travel downstream of work sites.

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).

In the action area, the threat to SONCC coho salmon, CC Chinook salmon, and NC steelhead from climate change are likely to be similar to those described above in the Species Status section. For example, the action area is likely to experience increases in average summer air temperatures; more extreme heat waves; and an increased frequency of drought (Lindley et al. 2007). In addition to the increased frequency of drought, high intensity rainfall events are also expected to become more common, leading to increased erosion and flooding. In future years and decades, many of these changes are likely to further degrade habitat throughout the watershed by, for example, reducing streamflow during the summer and raising summer water temperatures.

Coho salmon occurring in the action area belong to the Humboldt Bay Tributaries population of SONCC coho salmon, which is well below the number of adult spawners needed to be at low

risk of extinction (5,700 adults needed, NMFS 2014). Chinook salmon occurring in the action area belong to the Humboldt Bay Tributaries population of CC Chinook salmon, which is well below the number needed to be at low risk of extinction (2,600 adults required, NMFS 2016). Steelhead in the action area belong to the Humboldt Bay Tributaries population of NC steelhead, which is well below the number needed to be at a low risk of extinction (4,100 adults needed, NMFS 2016). All three populations of listed species have the same name and encompass all of the tributaries draining into Humboldt Bay. The spatial extent of these populations indicates that fish born in Freshwater Creek (a Humboldt Bay tributary) may return to Humboldt Bay as adults and spawn in any of the Humboldt Bay tributaries, as the entire network of tributaries draining into the bay constitute one population area.

The highest rated threats identified in the recovery plan for SONCC coho salmon include roads, channelization/diking, and agricultural practices (NMFS 2014). The highest rated threats identified in the recovery plan for NC steelhead include channel modification, livestock farming and ranching, and roads/railroads (NMFS 2016). The highest rated threats identified in the recovery plan for CC Chinook salmon include roads/railroads and channel modification (NMFS 2016). High priority recovery actions in the SONCC Coho Salmon Recovery Plan and the Coastal Multi-Species Recovery Plan (steelhead and Chinook salmon) are to increase instream structure; construct off channel habitats and oxbows; remove or set back levees; improve grazing practices; and restore tidally influenced areas (NMFS 2014, 2016). In most river systems throughout the Pacific Northwest and California, complex floodplain habitats have been subject to a high degree of direct anthropogenic modification.

Elk River was listed as a sediment impaired waterbody in 1998 under Clean Water Act Section 303(d). A draft Upper Elk River TMDL was released for public review in 2013 and the TMDL Action Plan was finalized in 2016. The goal of the TMDL Action Plan is to achieve sediment related water quality standards, including the protection of the beneficial uses of water in the upper watershed and prevention of nuisance conditions. The TMDL Action Plan set numeric targets for channel capacity (flood conveyance) and for chronic turbidity to address impairments associated with perceived nuisance flooding conditions and high suspended sediment concentrations. Waste discharge requirements have been established for all of the major landowners in the Upper Elk River TMDL area, and are intended to significantly reduce sediment inputs to the Elk River watershed.

2.4.1 Status of Listed Species and Critical Habitat in the Action Area

The portions of the North Folk Elk River within the action area are affected by the deposition of sediment. These areas have been aggrading for a number of years and will continue to aggrade as the action area is located in low gradient depositional reaches of a river a short distance upstream of tidal influence. Although these reaches, including the action area, have been aggrading for many years, significant aggradation rates were observed in the 1990's, after intense timber harvest and road construction activities upstream coincided with large rainfall events. Significant portions of the channels have filled with sediment, which have reduced pool depths and volumes and accommodated the ingrowth of vegetation in the channel. The reduced velocities and increased roughness resulting from aggradation have increased the frequency, magnitude, and duration of overbank flooding in and near the action area (Caltrout 2019). In 2004, the California State Water Board directed their staff to explore dredging the Elk River to ameliorate flooding

(Patenuade 2004), but ultimately the Board did not support dredging at the time due to conflicts with listed species.

Despite the significant aggradation observed in the 1990's, the action area and nearby reaches host high densities of SONCC coho salmon and NC steelhead during the summer months. During the 2011-2012 winter, there were 322 redds observed over a 3.55 mile reach upstream of the action area, for an average density of 90.7 redds per mile surveyed (Simpson 2012). Juvenile coho densities in the action area (0.95 to 1.60 fish per square meter) exceed those published for pool habitats in coastal Oregon watersheds (Lestelle 2007). The Humboldt Bay Tributaries population of SONCC coho salmon is one of the few populations in the entire ESU that is not at high risk of extinction (NMFS 2014). NC steelhead juveniles tend to be less abundant than SONCC coho salmon, but still average over 1.25 fish per square meter (Caltrout 2019), which reflects a greater density of steelhead than in nearby populations. The action area is consistently occupied by high densities of coho salmon and steelhead juveniles in the summer. CC Chinook salmon spawn in Elk River and transit and rear in the action area predominantly in the fall, winter and spring. However, as observed nearby in Lawrence Creek (tributary to the Van Duzen River), a small percentage of Chinook salmon juveniles rear in streams throughout the summer (sometimes referred to as stream type Chinook). Therefore, very few Chinook salmon juveniles rear in the action area during the summer months.

The condition of SONCC coho salmon, CC Chinook salmon and NC steelhead critical habitat in the action area, specifically its ability to provide for their conservation, is degraded from conditions known to support viable populations. The action area and nearby reaches have been subjected to a high degree of historic anthropogenic disturbance and manipulation, with historic logging, channelization, and filling of the channel occurring for decades. These changes have contributed to degraded conditions by altering the natural pattern and hydraulic capacity of the river, accommodating high rates of aggradation. The river has filled with sediment and dense vegetation occupies the bed and banks, contributing to higher frequency and longer duration flooding than observed in the past. The aggradation has compromised habitat values, reduced pool depths, and reduced concentrations of dissolved oxygen. Timber harvest, water diversion, and agriculture are expected to continue in the vicinity of and upstream of the action area.

Although the conveyance capacity of the channel has been reduced by the significant deposition of sediment and subsequent ingrowth of vegetation, these low velocity conditions rich with prey resources can be favorable for juvenile salmonids. Harvey and Railsback (2014) found that in low velocity environments (such as the action area), that search mode feeding is more important than drift feeding. Tippets and Moyle (1978) found epibenthic feeding to be common during higher turbidity in the McCloud River. Although turbidity and suspended sediments are likely high in the action area, there is dense vegetation and rich food resources available, which accommodates high densities of juveniles during the summer noted above, even though the habitat conditions have been modified and reduced over time by land use activities.

2.4.2 Previous ESA Section 7 Consultations in the Action Area

The action area is adjacent to, or within, areas covered by a Habitat Conservation Plan (HCP) for the Humboldt Redwood Company (HRC) and Kristi Wrigley. Kristi Wrigley owns approximately 200 acres of land covered by an HCP that has the same measures and requirements as the HRC HCP. The HCPs address forest management activities and rely on

minimization of effects from timber harvest practices by incorporating large no-harvest zones adjacent to watercourses and from mitigation required to upgrade and stormproof most of the road network. NMFS determined there would be adverse effects associated with the HRC HCP which might affect future salmonid returns, although the effects were mitigated to the maximum extent practicable. Stream restoration actions under programmatic consultations may also take place in the action area. These programmatic consultations include the NOAA Restoration Center's (RC) restoration program, and the Corps Regional General Permit 12 programmatic for salmonid restoration projects funded by CDFW. These consultations anticipate a limited amount of take for juvenile salmonids during instream work conducted in the summer months. NMFS determined these restoration actions are likely to improve habitat conditions for listed species and that the limited amount of take anticipated is unlikely to affect future adult returns. NMFS' ESA Section 10(a)(1)(A) research and enhancement permits and research projects in the annual CDFW ESA Section 4(d) rule research program could potentially occur in the Elk River watershed, including the reaches within the action area. Salmonid monitoring approved under these programs includes carcass surveys and juvenile surveys. In general, these activities are closely monitored and require measures to minimize take during the research activities. NMFS determined these research projects are unlikely to affect future adult returns.

2.5 Effects of the Action

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

2.5.1 Turbidity and Contaminants

Turbidity is expected to extend as far as 500-feet downstream from both the WOR and the FCR due to the fine particle sizes and the nature of the work. The duration of turbidity may differ between the two work sites, as the WOR is much smaller and will be completed much sooner, therefore turbidity at the WOR will be relatively short in duration and limited to 2-3 weeks. The FCR is much larger and will likely have a longer duration of turbidity during and after project completion, likely lasting several weeks. Based on the minimization measures proposed to manage turbidity and suspended sediments, the effects of turbidity on juveniles rearing downstream of the work sites is expected to be miniscule. The turbidity and suspended sediments generated by the Project are not expected to affect the value of critical habitat downstream. Contaminants will be managed in accordance with the proposed measures (including the use of vegetable-based fluids) to ensure that equipment is maintained, fueled, and staged at designated staging areas and that equipment would be inspected prior to and during use for leaks. NMFS expects the effects of toxic contaminants leaking into the action area to be improbable.

2.5.2 Vegetation Impacts

There will be significant impacts to riparian and coniferous vegetation in the action area, as vegetation is cleared to accommodate work and as part of the proposed action's objectives to reduce vegetation-related channel roughness. There will be approximately 5.89 acres of

vegetation impacted, of which 3.42 acres are riparian or coniferous forest type vegetation. Permanent impacts to riparian vegetation include a loss of 0.51 acres of riparian habitat at the WOR and a loss of 1.77 acres of riparian habitat at the FCR. Permanent impacts to coniferous forests include the loss of 0.12 acres of coniferous forest at the WOR and a loss of 0.52 acres of coniferous forest at the FCR. The loss of vegetation in the action area will affect values for shelter or velocity refuge; reduced food availability; and reduced cover as a significant portion of the removals will occur in the channel or along the banks. Approximately 1.15 acres will be replanted and monitored to ensure survival.

2.5.2.1 Loss of Cover and Velocity Refuge

Although small, the current riparian and coniferous vegetation provides a crude and incomplete velocity refuge when compared to a functioning alluvial river. The dense vegetation growing in the channel and along the banks is inundated during most storm events. These vegetated areas create flow obstructions, increase hydraulic boundary roughness, and provide velocity refuge across a diversity of flows. Regional red alder and willow growth rates show relatively slow growth for alders of less than 1 inch in diameter growth after 5 years (Bair 2000) and more rapid growth for willows (approximately 3 inches in diameter growth after 3 years). Shelter habitat formed by vegetation will decrease and will require several years for alders and willows to return to their baseline conditions (diameter and height). Shelter provided by riparian vegetation is especially important in areas that do not contain other types of instream shelter habitat, such as sloughs, off-channel areas, large wood, and deep pools (Quinones et al. 2005). NMFS does not expect any fitness consequences or harm to individuals due to the temporary reduction in channel roughness and velocity refuge in the action area. The action area is relatively small compared to areas nearby where fish will be able to find velocity refuge if needed. The value of critical habitat in the action area is expected to be reduced until vegetation becomes re-established within 5 years of construction.

2.5.2.2 Reductions in Prey

Riparian vegetation provides important nutrient inputs to streams such as leaf litter (Cummins et al. 1973) and terrestrial invertebrates that drop into the stream (i.e., allochthonous food subsidies). Leaf litter provides the food base for aquatic macro-invertebrate communities that in turn are part of the fundamental food source for salmonids (Bretscko and Moser 1993). Hardwoods, such as alder and willow, are one of the most important sources of leaf inputs to lower order streams (Meehan 1991). Hardwood leaves rapidly decompose in the stream, providing a source of nitrogen for primary productivity. Juvenile salmonids, particularly coho salmon and steelhead, depend on terrestrial insects as an important component of their diets, and all juvenile salmonids depend upon the food base that leaf litter provides for production of aquatic macro-invertebrates. In general, terrestrial invertebrates can comprise more than 33 to 50 percent of juvenile salmon diets (Allan et al. 2003).

The temporary and permanent impacts to vegetation in the action area, especially those to riparian and coniferous vegetation, will reduce the quality and quantity of critical habitat in the action area. The impacts to riparian and coniferous vegetation will cause adverse effects to the Prey Resources PBF and Juvenile Rearing PBF of critical habitat and affect future generations and cohorts of juveniles rearing in the action area after the Project is implemented. NMFS expects vegetation will return to near baseline conditions within 10 years, with adverse effects occurring until the fifth year post construction based on regional growth rates of riparian

vegetation. Due to the reduction in prey availability, NMFS expects that a small percentage of the individuals rearing in the action area during the first five years after construction will be subjected to degraded habitat conditions, but will be able to find abundant prey resources nearby in areas outside of the action area. Thus, NMFS expects that reductions in the fitness of these fish are unlikely.

2.5.3 Fish Relocation

As described in the *Proposed Action* section, fish removal and dewatering will occur throughout 2,375 feet of reaches that span two distinct work areas (WOR and FCR). NMFS expects densities in the action area to be similar to those from nearby Freshwater Creek (1.6 SONCC coho salmon/square meter and 1.28 NC steelhead/square meter). NMFS expects there will be 112 SONCC coho salmon and 90 NC steelhead captured and relocated from the WOR during the 2020 work season. In the FCR, NMFS expects there will be 2,011 SONCC coho salmon, 15 CC Chinook salmon, and 1,609 NC steelhead captured and relocated during the 2021 work season or in later work seasons depending on when funding is acquired.

Captured fish (minnow trap, seine, or electrofisher) will be relocated into one of the relocation reaches in the North Fork Elk River or South Fork Elk River. There is an estimated 3 percent mortality rate for salmonids as a result of fish capture and relocation for restoration projects (Collins 2004). NMFS expects a mortality rate of 5% for all species due to the longer transport times. This is due to the large number of fish expected to be captured and relocated, and because the relocation sites require trucking buckets of fish from the work areas, which is expected to take as long as 30 minutes. There are additional risks associated with vehicular transport of fish, such as acoustics, vibration, and spilling. There are 2,123 SONCC coho salmon expected to be captured from both reaches, which will likely result in 107 mortalities (7 in the WOR and 100 in the FCR). There are 15 CC Chinook salmon expected to be captured in the FCR, which will likely result in one mortality. There are 1,699 NC steelhead expected to be captured from both reaches, which will likely result in 85 mortalities (5 in the WOR and 80 in the FCR).

2.5.4 Crushing

Removing fish from a 2,375 foot reach of the North Fork Elk River will be difficult given the high level of complexity in some areas, and NMFS expects that a small percentage of the fish present may escape the trapping, seining, and electrofishing effort and become trapped in between the cofferdams and be exposed to dewatering and extensive equipment work. NMFS expects no more than 1% of the SONCC coho salmon or NC steelhead may escape capture and relocation efforts and perish inside the work areas. NMFS does not expect any CC Chinook salmon juveniles to escape the relocation effort. Juvenile CC Chinook salmon are expected to be present in low numbers, with only a total of 15 expected to be captured. Capture rates of juvenile CC Chinook are similar to SONCC coho salmon, where 1% of the fish may escape capture. Given the low probability, NMFS does not expect any CC Chinook to escape capture. Therefore, NMFS expects there to be one SONCC coho salmon and one NC steelhead trapped inside work areas and crushed in the WOR during 2020; and 20 SONCC coho salmon and 16 NC steelhead trapped inside work areas and crushed in the FCR in 2021 (or subsequent season). NMFS expects a total of 21 individual SONCC coho salmon and 17 NC steelhead trout to escape capture and become trapped inside the work areas, where they will perish.

2.5.5 Long-Term Effects

As previously discussed in the *Vegetation Impacts* section, there will be lingering effects to designated critical habitat after the Project is completed as riparian and coniferous vegetation regrows. Leaf litter and detritus inputs will be greatly reduced in the action area while vegetation regrows, likely leading to localized reductions in available prey resources for juvenile salmonids for as many as five years after all construction is complete. Shelter and velocity refuge will be impacted after all of the vegetation and organic materials are removed from the work areas. However, the Project proposes to install one wood structure in each of the pools being excavated, which will offset and minimize the reductions in velocity refuge. Although one wood structure in each pool represents a small increase in wood pieces and key pieces of wood in the action area, the availability of velocity refuge will be temporarily reduced and restricted to the areas immediately adjacent to the wood structures being installed until vegetation becomes established and can provide refuge. The creation of inset floodplain areas may also help provide limited velocity refuge in areas outside the eight wood structures. NMFS expects the excavated channel areas to return to pre-project sediment conditions within five years after construction, which is about when the adverse effects to the Prey Resources PBF will be offset by the regrowth of vegetation. As noted above, Elk River is listed under the CWA as impaired by sediment, and high concentrations of suspended sediments are expected to continue for many years given the high volumes of sediment stored within channels upstream of the Project.

2.6 Cumulative Effects

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

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

SONCC coho salmon, CC Chinook salmon, and NC steelhead in the action area are likely to be affected by future, ongoing non-federal activities like agriculture, water diversion, and timber harvest, both from upstream sources and within the action area. Water diversions also contribute to diminished stream flows and warmer water temperatures. The future effects of timber harvest include continued land disturbance, road construction and maintenance, and higher rates of erosion and sedimentation.

2.7 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. 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 for the conservation of the species.

SONCC coho salmon, CC Chinook salmon, and NC steelhead have all declined to a large degree from historic numbers. Almost all of the populations of SONCC coho salmon are at a high risk of extinction, and the Humboldt Bay Tributaries Populations are ones of a few that are only at a moderate risk of extinction. Despite temporarily improving pool depths, adding several new wood structures, and creating an inset floodplain in some reaches, the value of critical habitat will be temporarily adversely effected by the Project. Despite temporarily deeper pool depths and a more accessible floodplain, the removal of the existing complex vegetation will reduce leaf litter, nutrient inputs, and disrupt the detrital food web, thus temporarily reducing the availability of prey in the action area for approximately 5 years after construction. Outside the action area, the Elk River watershed will continue to provide suitable rearing habitat with prey resources available to fish during their downstream migration or while rearing during the summer. Other tributaries, sloughs, and off channel areas within the Humboldt Bay Tributaries population area are likely to provide similar suitable habitat conditions.

The Project entails capturing and relocating large numbers of SONCC coho salmon, CC Chinook, and NC steelhead out of the work areas. Of the thousands of individuals captured and relocated, some are expected to perish. The loss of 128 individual SONCC coho salmon, one individual CC Chinook salmon, and 102 NC steelhead juveniles is not expected to affect future adult returns. The loss of juveniles is temporary (during one summer at each project site) and represents a small percentage of the overall number of individuals in the population. The overall number of individuals in the population will likely provide a compensatory effect. Other areas of Elk River, and other tributaries within the Humboldt Bay Tributaries population area, such as Freshwater Creek, also host similar or greater densities of SONCC coho salmon, CC Chinook salmon, and NC steelhead than the action area and are expected to continue to contribute to the population during the time period when some juveniles in the action area will likely be harmed or killed as a result of this proposed project.

The action area could be subject to higher average summer air temperatures and lower total precipitation levels due to climate change. Although the total precipitation levels may decrease, the average rainfall intensity has increased and is expected to continue to increase in the future. Higher air temperatures would likely warm stream temperatures. Reductions in the amount of precipitation would reduce stream flow levels and estuaries may also experience changes in productivity due to changes in freshwater flows, nutrient cycling, and sediment amounts. For this project, all construction activities would be completed by 2025 and the likely long term effects of climate change described above are unlikely to be detected within that time frame. The short-term effects of project construction would have completely elapsed prior to these climate change effects. Overall, the project is unlikely to appreciably reduce the likelihood of survival and

recovery of SONCC coho salmon, CC Chinook salmon, and NC steelhead, and the project is unlikely to appreciably diminish the value of designated critical habitat for the conservation of these species.

2.8 Conclusion

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

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). "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:

Relocation
Take of a total of 2,123 juvenile SONCC coho salmon, 15 juvenile CC Chinook salmon, and 1,699 juvenile NC steelhead is expected over the five year permit during relocation activities. Of these, approximately 5% of the relocated fish will be killed, resulting in a total of 107 SONCC coho salmon juveniles killed; one CC Chinook salmon juvenile killed; and 85 NC steelhead juveniles killed.

Crushing and Stranding
Take of a total of 21 juvenile SONCC coho salmon and 17 juvenile NC steelhead is expected over the five year permit due to fish being stranded inside work areas and exposed to all of the effects of the Project.

Total Amount of Take
Combined, there are 2,144 individual juvenile SONCC coho salmon; 15 individual juvenile CC Chinook salmon; and 1,716 individual juvenile NC steelhead expected to be taken by the

Project in the form of capture and relocation. A total of 128 SONCC coho salmon juveniles are expected to be killed during relocation or because of stranding; one CC Chinook salmon juvenile is expected to be killed during relocation; and 102 NC steelhead juveniles killed during relocation or because of stranding.

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 nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02). NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of SONCC coho salmon, CC Chinook salmon, and NC steelhead:

Ensure that all necessary and appropriate actions to minimize injury and mortality to coho salmon, and Chinook salmon, and steelhead resulting from fish relocation and dewatering activities are properly implemented during construction so that mortality of listed species is low. Submit annual reports regarding fish relocation, monitoring results, and progress towards construction and attainment of objectives.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the Corps or any applicant must comply with them in order to implement the RPMs (50 CFR 402.14). The Corps or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

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

    a. The Applicant shall allow any NMFS and CDFW employee(s) or any other person(s) designated by NMFS and CDFW, to accompany field personnel to visit the project site during activities described in this opinion.
    b. Qualified biologists with expertise in the areas of anadromous salmonid biology shall conduct fish relocation activities associated with construction, and shall be approved as the Designated Biologist by CDFW.
    c. The Designated Biologist will be responsible for confirming and monitoring for compliance with the Opinion.
    d. The Applicant or their contractor performing fish relocation shall not herd fish using an electrofisher.
    e. Salmonids shall be handled with extreme care and kept in water to the maximum extent possible during rescue activities. All captured fish must be kept in cool, shaded, and aerated water protected from excessive noise, jostling, or overcrowding or potential predators any time they are not in the

stream, and fish will not be removed from this water except when released. Captured salmonids will be relocated as soon as possible to an instream location in which suitable habitat conditions are present to allow for adequate survival for transported fish and fish already present. Fish will be distributed between multiple pools if biologists judge that overcrowding may occur in a single pool.

f. If the Applicant determines that ice is needed to cool water inside of buckets, the ice used shall be contained inside of plastic so that as the ice melts, the melted water is contained in a watertight sealed package.
g. The Applicant or their contractor shall monitor any screens used to block fish access on a daily basis, or more frequently if necessary, to ensure that no impingement occurs, and to assess whether significant downstream migration is occurring.
h. The Applicant shall ensure that any minimization measures described in the Proposed Federal Action section or supporting documents are properly implemented.
i. The Applicant shall contact NMFS and CDFW within 24 hours of meeting or exceeding take of listed species prior to project completion. Notify Matt Goldsworthy by phone at 707-825-1621 or email at Matt.Goldsworthy@noaa.gov and Jennifer Olson by phone at 707-445-5387 or email at Jennifer.Olson@wildlife.ca.gov. NMFS and CDFW will review the activities resulting in take and determine if additional protective measures are required.

2. The following terms and conditions implement reasonable and prudent measure 2:
    a. The Applicant shall provide a written report to NMFS and CDFW by January 15 of each year. The report shall be sent to NMFS via email to Matt.Goldsworthy@noaa.gov and Jennifer.Olson@wildlife.ca.gov or via mail to Matt Goldsworthy at 1655 Heindon Road, Arcata, California, 95521 and Jennifer Olson at 619 Second Street, Eureka, California, 95501. The report shall contain, at a minimum, the following information:
    b. **Fish Relocation** – The report will include description of the location from which fish were removed and the release site including photographs; the date and time of the relocation effort; a description of the equipment and methods used to collect, hold, and transport salmonids; the number of fish relocated by species; the number of fish injured or killed by species and a brief narrative of the circumstances surrounding salmonid injuries or mortalities; and a description of any problems which may have arisen during the relocation activities and a statement as to whether or not the activities had any unforeseen effects.

2.10 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding

discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). NMFS has no conservation recommendations to suggest.

2.11 Reinitiation of Consultation

This concludes formal consultation for the Elk River Sediment Remediation and Habitat Rehabilitation Project. As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

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

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." 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) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

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

3.1 Essential Fish Habitat Affected by the Project

Essential Fish Habitat is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802[10]). "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). The term "adverse effect" means any impacts which reduce the

quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrates and loss of, or injury to, benthic organisms, prey species, and their habitats, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of it and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.910). The EFH consultation mandate applies to all species managed under a Fishery Management Plan (FMP) that may be present in the action area.

The Pacific Coast Salmon FMP contains EFH that will be adversely affected by the Project. Furthermore, the project is located in a Habitat Area of Particular Concern (HAPC) for federally managed fish species (Chinook and coho salmon) under the Pacific Coast Salmon FMP. HAPC are described in the regulations as subsets of EFH that are identified based on one or more of the following considerations: the importance of the ecological function provided by the habitat; the extent to which the habitat is sensitive to human-induced environmental degradation; whether, and to what extent, development activities are, or will be stressing the habitat type; and the rarity of the habitat type (50 CFR 600.815(a)(8)). Designated HAPC are not afforded any additional regulatory protection under MSA; however, federal projects with potential adverse impacts to HAPC are more carefully scrutinized during the consultation process. One of the HAPCs that were developed as part of the Pacific Coast Salmon FMP is Complex Channels and Floodplain Habitats. The HAPC developed for Complex Channels and Floodplain Habitats will be adversely affected due to the removal of vegetation and all organic materials in the channel.

3.2 Adverse Effects on Essential Fish Habitat

Both Chinook salmon and coho salmon are expected to occur seasonally within the action area. The effects to coho salmon and Chinook salmon critical habitat have already been described in the Effects of the Action section. The adverse effects to EFH and HAPC in the action area include:

1. Temporary reduction in water quality caused by increase in suspended sediments and turbidity.
2. Removal/loss of vegetation and organic materials in the channel (adverse effect to the Complex Channel and Floodplain Habitat HAPC).

3.3 Essential Fish Habitat Conservation Recommendations

Most of the adverse effects from the proposed action are temporary and expected to recover within several years. As described in the Effects of the Action section, the Project is expected to reduce the amount of riparian and coniferous vegetation along the bed and banks of the channel, leading to adverse effects to prey resources and to the quality of rearing habitat until vegetation regrows to previous conditions. Therefore, NMFS suggests the following Conservation Recommendation to minimize or compensate for the adverse effects:

1. The Applicant shall ensure that all wood structures contain the maximum amount of small woody materials interwoven into and between the proposed wood pieces, so

that there is not any opening into the structure greater than one foot in diameter. Reducing the extent of the openings may provide a more complete refuge from velocity, as hydraulic roughness of the wood itself may increase localized velocities around the wood pieces. Minimizing the openings and spaces in between wood pieces helps ensure that complete velocity refuge is being provided.

Fully implementing this EFH conservation recommendation would protect EFH and HAPC, by avoiding or minimizing the adverse effects described in section 3.2 above.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the Corps must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 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 user of this opinion is the U.S. Army Corps of Engineers. Other interested users could include the Applicant and California Department of Fish and Wildlife. A copy of this opinion was provided to the Corps. The format and naming adheres to conventional standards for style.

4.2 Integrity

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

4.3 Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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