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 21, 2019 **Refer to NMFS No:** WCRO-2019-00341

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 Cochran Creek and Quail Slough Fish Passage and Habitat Enhancement Project in Humboldt County, California (Corps File No. 2019-00129N)

Dear Mr. Mazza:

Thank you for your letter of April 22, 2019, requesting initiation of formal 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.). 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 Cochran Creek and Quail Slough Fish Passage and Habitat Enhancement Project (Project).

The enclosed biological opinion describes NMFS' analysis of potential 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 action, as proposed, is not likely to jeopardize the continued existence of SONCC coho salmon, CC Chinook salmon, and NC steelhead or 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 is included with the enclosed biological opinion. The incidental take statement includes non-discretionary reasonable and prudent measures and terms and conditions that are expected to further reduce anticipated incidental take.

Updates to the regulations governing interagency consultation (50 CFR Part 402) become effective October 26, 2019 [84 FR 44796]. 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 opinion is fully consistent with the updated regulations.

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# 151422WCR2019AR00082

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

Cochran Creek and Quail Slough Fish Passage and Habitat Enhancement Project
Humboldt County, California

NMFS Consultation Number: WCRO-2019-00341
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: October 21, 2019

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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 USC 1531 et seq.), and implementing regulations at 50 CFR 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 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

On April 22, 2019, NMFS received the U.S. Corps of Engineers' (Corps) request to initiate formal ESA consultation on the 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 as well as a request to initiate MSA EFH consultation.

On May 3, 2019, NMFS requested clarification via email regarding the duration of the permit, extent of the Project's effects, and proposed monitoring plans. On May 28, 2019, the Corps responded via email with clarification regarding the extent of the Project effects and confirmed the permit duration would be for 10-years (with re-issuance of the permit required after 2022).

On June 12, 2019, a Post Project Fisheries Monitoring Plan was submitted to NMFS as an update to the proposed action. On June 12, 2019, NMFS initiated formal consultation.

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 permit pursuant to Section 404 of the Clean Water Act to Mr. John Gary and Ms. Heather Plaza (the Applicants), which is set to expire in 2022 but could be re-issued for an additional five to seven years. The permit would cover enhancement work to improve habitat conditions on a working farm in Eureka, California. The project's goals are to improve fish passage as well as enhance and expand tidal, brackish, freshwater and riparian habitat conditions on Cochran Creek and Quail Slough. The primary components of the Project

are intended to provide mutual benefits for both listed species and for adjacent agricultural lands by reducing flooding and enhancing drainage. The Project area that will be subject to enhancement actions is approximately 6.1 acres. The total Project area including the adjoining easterly agricultural land that will receive fill material, but remain in agricultural production, is 21.8 acres.

1.3.1 Improve Fish Passage and Tidal Prism

The existing top-hinged tide gate prevents or severely impedes passage of most adult salmonid species between Fay Slough and Cochran Creek and Quail Slough. Replacement of the existing tide gate with a fish-friendly side-hinged tide gate will provide improved migration access for adult and juvenile fish. Constructing a new channel and floodplain with enhanced morphology between the tide gate and culvert under Myrtle Avenue, as well as constructing an engineered drop structure (a roughened channel designed in a pool-chute configuration) to overcome a 4.4 foot elevation difference, will also improve fish passage to the upper watershed of Cochran Creek.

Replacing the tide gate door will also increase stormwater runoff capacity and efficiency. The existing concrete housing remains in good condition and will be retained. The existing culvert beneath the dike has filled with sediment, which will be excavated to regain flow capacity. After channel realignments in Cochran Creek and Quail Slough, a single channel will connect to the tide gate on Fay Slough. Muted tidal prism and estuarine habitat will be restored to approximately 950 feet (ft) of the new Cochran Creek channel, which should help control the growth of invasive reed canary grass. Installing a side-hinged door in the tide gate with an adjustable opening will create a muted tide in Cochran Creek and Quail Slough, resulting in the tidal inundation of approximately 3.0 acres.

A tidal berm (see Figure 1: Conceptual Design Map) will be constructed along the southern floodplain boundary of Cochran Creek and adjacent to both banks of Quail Slough to contain the expanded tidal prism to protect agricultural lands from saltwater inundation and provide a planting platform for riparian vegetation.

1.3.2 Enhance and Expand Instream and Floodplain Habitat

This project will create approximately 930 ft and 0.7 acres of new stream channel or backwater habitats; 0.6 acres of floodplain habitats (freshwater and inter-tidal/brackish wetlands); and 0.4 acres of riparian habitat on Cochran Creek. The lower 760 ft of the new Cochran Creek channel will be low gradient, approximately 20 ft wide and 2 ft deep. The upper 170 ft will be a roughened pool-chute channel (drop structure) that will rise 4.4 ft to the outlet of the culvert under Myrtle Avenue. The channel design will restore fluvial processes that will enhance and maintain instream and floodplain morphology, structural diversity, and a riparian corridor. Reed canary grass will be physically removed from the existing Cochran Creek channel. The existing Quail Slough channel will be widened to approximately 25 ft (0.8 acres) and an inset floodplain (1.0 acres) will be excavated in the lower reach to provide inter-tidal/brackish wetland habitats. Backwater features will be constructed to provide 0.14 acres of seasonal off-channel rearing habitat for salmonids in Cochran Creek and Quail Slough. Inter-tidal/brackish wetlands (1.5 acres) in the floodplain adjacent to the Cochran Creek and Quail Slough channels will likely be

colonized by salt and brackish water wetland plant species. If planting stock is available these areas may be planted with appropriate salt and brackish water wetland plant species. Riparian trees will be planted adjacent to the floodplain channel on tidal berms in a 20-30 ft wide corridor along the south side of Cochran Creek and on both banks of Quail Slough.

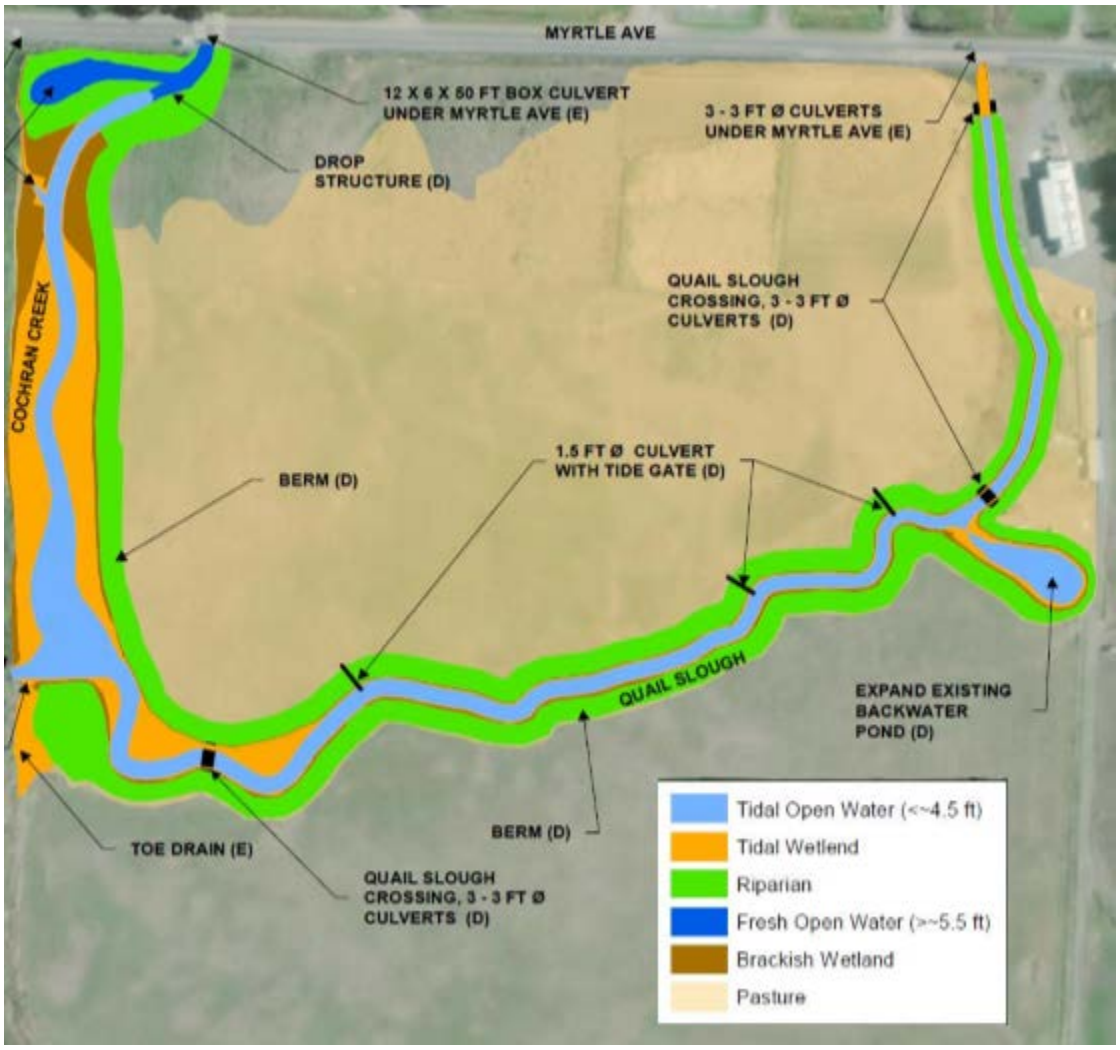

Figure 1: Conceptual Design Map

1.3.3 Reducing Overbank Flooding and Fish Stranding

Cochran Creek is currently channelized in an open ditch, with frequent overbank flooding and possible fish stranding in adjacent agricultural lands. Sediments mobilized from the upper watershed have been aggrading within most of the Project area. Prolific growth of reed canary grass in Cochran Creek also exacerbates overbank flooding. Quail Slough lacks confinement and overbank flooding occurs during stormwater runoff. This project will create approximately 3,000 ft of inset floodplains connected to the enlarged channels of Cochran Creek and Quail Slough. The enhanced muted tide cycle will help suppress the growth of reed canary grass and flush

sediments from the channels. Construction of tidal berms are designed to contain tidal inundation, reduce overbank flooding, and fish stranding.

1.3.4 Fish Removal and Relocation

All reasonable efforts will be made to capture and move all fish observed in the dewatering area. A qualified biologist will supervise the relocation and handling of any protected species. Methods for safe capture and relocation of fish from the isolated work area may include use of connecting rod snakes, seine nets, baited minnow traps, dip nets, and electrofishing. At most locations in Cochran Creek, a combination of methods will be necessary. To avoid and minimize the risk of injury to fish, attempts to flush, seine, use of minnow traps, and/or dip net fish will always precede the use of electrofishing equipment. Visual observation techniques (e.g., snorkeling, surveying with polarized glasses) may be used to assess the effectiveness of these methods, to identify locations where fish are concentrating, or otherwise adjust methods for greater effectiveness. Fish relocation activities will not occur if water temperatures exceed 21° C.

Much of the 1,000 ft length of mainstem Cochran Creek needing to be dewatered possesses dense vegetation that encroaches on the channel; these conditions will make seining difficult or infeasible. Galvanized, baited minnow traps will be used to capture fish from habitats where seining is impractical or inefficient. Traps will be deployed either on the stream bottom (benthic) or secured in the middle of the water column tethered to habitat structure such as woody debris. To prevent predation of juvenile fish, traps will be set for periods of between 30 and 180 minutes at a time and then pulled and checked for captured fish. Dip nets and/or aquarium nets will be used to collect and relocate any fish that were not captured prior to the initiation of dewatering. The supervising biologist will coordinate dip-netting operations with dewatering plans to minimize stress and risk of injury to fish (including stranding). While fish relocation efforts prior to dewatering will remove most fish residing in the reach, some individual fish may remain and become prone to stranding during dewatering.

Electrofishing will conform to California Department of Fish and Wildlife (CDFW) electrofishing methods (Flosi et al. 1998) and NMFS (2000) Electrofishing Guidelines. Backpack electrofishing will be utilized only when other methods of fish capture have proven impracticable or ineffective. Stunned fish retained in holding buckets will be visually monitored until they are fully recovered/freely swimming. The supervising biologist will ensure that all captured fish will be kept in cool, shaded, aerated water (drawn from area of capture in Cochran Creek) in holding containers such as 5-gallon buckets with lids and battery powered aerators. Captured fish will be protected from excessive noise, jostling, and overcrowding, and fish shall not be removed from this water except when released. Captured fish will not be anesthetized or measured. To avoid predation while in captivity, the biologist will segregate young-of-year fish from larger age-classes and other potential aquatic predators in holding containers. Fish will be handled with extreme care, kept in water to the maximum extent possible, and relocated as soon as possible to suitable upstream habitats. Fish will be relocated to the portion of Cochran Creek upstream of Myrtle Avenue.

1.3.5 Streamflow Diversion and Dewatering

Stream flow diversion and dewatering of Cochran Creek and Quail Slough will follow isolating the work area and fish capture/relocation. Flow diversion and channel construction dewatering will be implemented to maintain a dry work site for the duration of construction. All work areas will be dewatered to accommodate excavation in areas of expected high groundwater. Stream diversion of Cochran Creek will be done at the upstream end of the Project by either screened gravity flow or mobile pump and discharged either into the inboard ditch that drains to Redmond Creek, or directly into Fay Slough. A mobile pump with an approved fish screen and pipe system will be utilized to dewater the work areas and discharge the construction water from Cochran Creek to Quail Slough. To dewater Quail Slough, a cofferdam with a pump and pipe system will collect and divert seepage and water discharged during construction of the downstream end of Cochran Creek, into either the in-board ditch that drains to Redmond Creek, or directly into Fay Slough.

Tidal water incursion from Fay Slough is not expected because the tide gate will be bolted shut for duration of construction. Replacement of the tide gate door will occur during low flow periods during a neap tide and a single tidal cycle. Thus, dewatering the area nearest the tide gate will not be necessary to replace the tide gate door. If needed, the contractor will be able to lower the existing tide gate during a high tide or build a cofferdam barrier on the downstream end of the concrete apron to prevent intrusion of tidal waters into the project area during this phase of construction. Any sediment that needs to be removed from the tide gate structure will be excavated as part of the channel construction after the system is dewatered and the new tide gate bolted shut.

1.3.6 Post Project Monitoring

After construction, monitoring will occur throughout the area to evaluate species use and effectiveness of the Project in meeting its goals and objectives. The proposed fisheries monitoring includes two primary objectives: (1) document spatial and seasonal use patterns of presence and distribution for juvenile salmonids and other fish species utilizing tidally-influenced regions of Cochran Creek and Quail Slough, and in freshwater habitats upstream of tidal influence in the Cochran Creek watershed; and (2) document adult salmonid spawning activity in anadromous accessible reaches of Cochran Creek after installing a side-hinge tide gate that increases opportunity for adult fish passage.

Monitoring is expected to occur for five years after the construction of the Project is complete, with annual reports provided by December 31 of each year in which monitoring occurs. Monitoring techniques consist of using baited minnow traps and beach seines to capture, handle, and release various life stages and species. Spawning surveys will also occur during the appropriate season, although captures of any life stages are not anticipated during spawning surveys.

1.3.6.1 Monitoring Plan

Sampling will not occur if ambient water temperatures exceed 21°C. In all cases buckets used for holding fish will be filled with clean ambient source water, and equipped with battery-operated

bubbler units that will ensure re-circulation of oxygen-rich water throughout processing of captured specimens.

A biologist will visually monitor numbers of captured fish held in each bucket to ensure low densities of animals (< 15 juvenile salmonids). In the event that many fish are captured, or that there is a delay in field processing, held specimens will be relocated to a flow-through mesh-net bag anchored nearby in the source stream/water body, while safely away from survey activities. Any captured non-salmonid fish, and adult salmonids will be identified to species, counted, and then released back to the source area immediately following recovery from handling.

Fish will be closely observed in an anesthetic bath of Alka –Seltzer Gold (aspirin free) brand sodium bicarbonate (NaHCO3) until loss of equilibrium is achieved but operculum movement is still present. The lowest concentration of sodium bicarbonate that will permit safe handling will be used and will range from 1 to 2 tablets per gallon of fresh river water depending on fish size and water temperature. The bicarbonate material will be allowed to completely dissolve before fish are added to the anesthetic bath. Salmonid fry and juveniles will be anesthetized in groups of 3-5 fish, and larger parr and smolts will be anesthetized in groups of 1-3 fish. Salmonids should be able to be handled after 1-2 minutes in the anesthetic bath and will be processed immediately following loss of equilibrium. A product called Stress Coat will be added to the anesthetic solution as needed to combat stress from loss of the protective slime layer during handling. Fish will be allowed to recover in 5 gallon buckets of aerated fresh river water until normal behavior is observed. Water temperature in the recovery bucket will be monitored and maintained to be within 2 degrees of the ambient river temperature.

Juvenile salmonids will be placed individually onto a wetted Plexiglas measuring board and measured to the nearest mm fork length, then transferred to a wetted container on an electronic scale and individually weighed to the nearest 0.01 gram. Following processing, fish will immediately be transferred to recovery buckets filled with clean ambient source water, and equipped with battery-operated bubbler units that will ensure recirculation of oxygen-rich water to facilitate recovery of equilibrium. Following adequate recovery time, all processed fish will be released unharmed back to the site of their capture.

1.3.7 Interrelated and Interdependent Actions

"Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02). There are no interrelated or interdependent actions associated with the proposed action.

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/or an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of" a listed species, which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both 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 for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features" (81 FR 7214).

The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The new critical habitat regulations (81 FR 7414) replace this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

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

- Identify the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors by: (1) Reviewing the status of the species and critical habitat; and (2) adding the effects of the action, the environmental baseline, and cumulative effects to assess the risk that the proposed action poses to species and critical habitat.
- Reach a conclusion about whether species are jeopardized or critical habitat is adversely modified.
- If necessary, suggest a RPA to the proposed action.

Updates to the regulations governing interagency consultation (50 CFR part 402) will become effective on October 26, 2019 (84 FR 44976, August 27, 2019). Because this consultation was pending and will be completed prior to that time, we are applying the previous regulations to the consultation. However, as the preamble to the final rule adopting the new 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." Thus, the updated regulations would not be expected to alter our analysis.

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 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. A study by MacFarlane (2010) indicated

that juvenile Chinook salmon require less prey in the estuary, equivalent to one northern anchovy (*Engraulis mordax*) per day, compared to a range of one to four anchovies needed per day in the 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 and resident freshwater 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. The 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 (McElhany 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, most of the 30 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.

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 and is inadequate to contribute to a viable ESU, given the significant reductions in abundance and distribution.

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.

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

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).

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 (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 Degradation of 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, the drought in California reduced stream flows and increased temperatures, further exacerbating stress and disease. Ocean conditions have been unfavorable in recent years (2014 to present) due to the El Nino in 2015 and 2016. 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. Information since these species were listed suggests that the earth's climate is warming, and that this change could significantly impact ocean and freshwater habitat conditions, which affect survival of species subject to this consultation. In the coming years, climate change will

influence the ability to recover coho and Chinook salmon in most or all of their watersheds. Steelhead are particularly vulnerable to climate change due to their need for year-round cool water temperatures (Moyle 2002). Through effects on air temperatures and stream flows, climate change is expected to increase water temperatures to the detriment of coho and Chinook salmon. 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 all of the work areas, pasture, temporary access roads, and approximately 200 linear feet downstream of all work areas where temporary increases in turbidity may occur.

2.4 Environmental Baseline

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 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

In the action area, the threat to SONCC coho salmon, CC Chinook salmon, and NC steelhead from climate change is likely to include a continued increase in average summer air temperatures; more extreme heat waves; and an increased frequency of drought (Lindley et al. 2007). 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. Many of these impacts will likely occur in the action area via higher water temperatures and reduced flows in Cochran Creek.

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

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 required, 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 required, 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 suggests 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 Plans 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.

The condition of SONCC coho salmon, CC Chinook salmon and NC steelhead critical habitat, specifically its ability to provide for their conservation, is degraded from conditions known to support viable populations. The portion of Cochran Creek and Quail Slough within the action area are essentially channelized agricultural ditches with very little habitat value. Most salmonid use in the action area is impeded by tide gates downstream which impede fish passage and limit the volume of tidewater allowed into the action area. Cochran Creek has reed canary grass occupying a significant portion of the channel, which contribute to poor water quality and habitat.

2.4.2 Previous ESA Section 7 Consultations and Research Approvals in the Action Area

Stream restoration actions under programmatic consultations may 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 Cochran Creek or Faye Slough watershed, including the reaches within the action area. Salmonid monitoring approved under these programs includes carcass surveys, seining for adult speciation, 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" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

2.5.1 Turbidity and Contaminants

Brief periods of turbidity are expected to extend as far as 200-feet downstream of the tide gate on Cochran Creek and into Fay Slough, and last for only a few hours. The project will be breached during an incoming tide, so that most turbidity is carried into the work sites and project area, and thus limiting the extent that travels downstream to insignificant levels. Contaminants from heavy equipment will be managed in accordance with the proposed minimization measures. Based on these measures, exposure of listed species and critical habitat to contaminants is improbable.

2.5.2 Relocation and Stranding

Before de-watering activities begin, cofferdams will be erected and fish will be relocated out of the construction area and relocated into a flowing channel by a fisheries biologist. In deeper or larger areas, water levels may first be lowered to manageable levels using methods to ensure no impacts to fish. A qualified fisheries biologist or aquatic ecologist will then perform appropriate seining, dip netting, trapping and/or electrofishing to a point at which the biologist is assured that almost all individuals within the work area have been caught. These individuals will be kept in buckets or insulated coolers equipped with battery operated aerators to ensure survival, and will be relocated to an appropriate flowing channel segment or other appropriate habitat as identified by NMFS.

Fish relocation activities pose a risk of death or injury to any salmonids present. Any fish collecting gear has some associated risk to fish, including stress, disease transmission, injury, or death (Hayes et al. 1996). Seining, dip netting, and trapping associated with fish relocation activities may result in injury or death to salmonids (see the Monitoring section below) including crushing or stranding, as these methods may not be able to capture all fish within the area to be dewatered. The amount of unintentional injury and mortality attributable to fish capture varies widely depending on the method used, the ambient conditions, the number of fish present, and the expertise and experience of the field crew. Because fish relocation activities will be conducted by qualified fisheries biologists, direct effects to and mortality of juvenile coho salmon, Chinook salmon, and steelhead during capture will be minimized. Consequently, small numbers of juvenile coho salmon, Chinook salmon, and steelhead may be injured or killed from crushing or stranding during fish relocation events.

Fish will be relocated from all 1,000 feet of the work areas in Cochran Creek, and as many as 25 juvenile SONCC coho salmon and 25 juvenile NC steelhead are expected to be captured and relocated. Of these fish relocated, a small percentage will be killed do to handling, and result in as many as one juvenile SONCC coho salmon and one juvenile NC steelhead killed during handling. Fish capture and relocation from the dewatered reach is not expected to capture every fish present in the action area, and a small percentage of fish may escape capture and become stranded in the work sites. All of the fish stranded in the work sites are expected to perish. NMFS expects that 4 juvenile SONCC coho salmon and 6 juvenile NC steelhead will escape capture and perish in the work areas.

2.5.3 Monitoring

Beach seines will be used to capture juvenile ESA-listed salmonids. Beach seines encircle and concentrate fish, and then the seine is brought to shore where fish are removed and placed into buckets or live-cars. The potential adverse effects of capture by seine on juvenile ESA-listed salmonids include entanglement (gilling), scale and mucus abrasion, suffocation, and crushing. Seines and dip-nets with knotless nylon mesh will be utilized to minimize scale and mucus abrasion. Seine tows will be short to prevent suffocation and to ensure that no debris (e.g., rocks, logs, abundant vegetation) are trapped in the seine that may suffocate or crush fish. In the event that debris is trapped within the beach seine, the debris will be removed before fish are centralized in the net to prevent harm. Biologists will use the smallest mesh-size seine-net that is appropriate to achieve sampling objectives while reducing the probability that smaller fish will become gilled in the net. Minnow traps will be used to capture juvenile ESA-listed salmonids. Traps will be fished at each site on the bottom of the channel next to habitat structures if possible, with a short soak time from 30 to 180 minutes.

Any physical handling or psychological disturbance is known to be stressful to fish (Sharpe et al. 1998). The primary contributing factors to stress and death from handling are excessive doses of anesthetic, differences in water temperatures (between the creek and wherever the fish are held), dissolved oxygen conditions, the amount of time that fish are held out of the water, and physical trauma. Stress on salmonids increases rapidly from handling if the water temperature exceeds 18º Celsius or dissolved oxygen is below saturation. Fish that are transferred to holding tanks can experience trauma if care is not taken in the transfer process, and fish can experience stress and injury from overcrowding in traps if the traps are not emptied regularly. Decreased survival of fish can result when stress levels are high because stress can be immediately debilitating and may also increase the potential for vulnerability to subsequent challenges (Sharpe et al. 1998). The proposed action contain measures that mitigate the factors that commonly lead to stress and trauma from handling, and thus minimize the harmful effects of capturing and handling fish. When these measures are followed, fish typically recover fairly rapidly from handling.

Post construction monitoring is expected to occur annually for five years and have an annual total of 938 juvenile SONCC coho salmon; 3 adult SONCC coho salmon; 240 juvenile CC Chinook salmon; 578 juvenile NC steelhead; and 3 adult NC steelhead. There are no mortalities of adult SONCC coho salmon or NC steelhead expected. However, a small percentage (1%) of the juveniles captured and handled are expected to be injured or killed during monitoring

activities each year. The expected number of mortalities each year is expected to be 10 juvenile SONCC coho salmon; 3 juvenile CC Chinook salmon; and 6 juvenile NC steelhead. The combined five-year total numbers of captures are expected to be: 4,690 juvenile SONCC coho salmon; 15 adult SONCC coho salmon; 1,200 juvenile CC Chinook salmon; 2,890 juvenile NC steelhead; and 15 adult NC steelhead are expected to be captured using beach seines and minnow traps. Therefore, the cumulative total of mortalities that NMFS expects is as many as 50 juvenile SONCC coho salmon; 15 juvenile CC Chinook salmon; and 30 juvenile NC steelhead to be killed over the five years of monitoring.

2.5.4 Effects to Critical Habitats

NMFS anticipates the value of critical habitat will be improved as a result of the Project. Most of the effects of the Project will be short term and not result in meaningful changes. Several PBFs of critical habitat will be improved by the Project, such as fish passage and migration; prey resources; estuarine habitat; water quality; and reduced stranding during overbank flooding. Therefore, NMFS expects long term improvements to the quality or quantity of critical habitat.

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 and cannabis cultivation, water diversion, and timber harvest, both from upstream sources and within the action area. Cannabis cultivation often results in forest clearing and both agriculture and cannabis involve water diversion from streams or otherwise removed to irrigate crops, contributing to diminished stream flow and higher water temperatures. Water diversion for other uses also contributes 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 diminishes 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. CC Chinook salmon have fragmented population structures, placing them at additional risk. Summer run populations of NC steelhead are in very poor condition. Because the action area is upstream of a tide gate which impedes fish passage, fish presence will be very low and adults are not expected to occur at all. As described in the Effects of the Action section, a small number of juveniles of all three species may be injured or killed during construction and subsequent monitoring activities. NMFS does not expect that the loss of juveniles by this project would impact future adult returns for SONCC coho salmon, CC Chinook salmon, or NC steelhead. The Project will improve critical habitat by improving and enhancing a number of PBFs for all three listed species, and also expected to result in increases in distribution and abundance in the action area. The value and function of critical habitat will be improved.

The action area could be subject to higher average summer air temperatures and lower total precipitation levels due to climate change. 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 2029 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 and Stranding

Take of 25 juvenile SONCC coho salmon and 25 juvenile NC steelhead are expected via capture and relocation for dewatering, with one juvenile SONCC coho salmon and one juvenile NC steelhead expected to be killed during relocation efforts. Additionally, NMFS expects that 4 juvenile SONCC coho salmon and 6 juvenile NC steelhead will escape capture be killed in the work areas.

Monitoring

Five years of monitoring is expected after construction and the annual and cumulative totals for each species and life stage is presented in Table 3.

Table 3. Annual and cumulative take totals.

Species	Life Stage	Annual Captures	Annual Mortalities	Five Year Total Captures	Five Year Total Mortalities
SONCC coho salmon	Juvenile	938	10	4,690	50
SONCC coho salmon	Adult	3	0	15	0
CC Chinook salmon	Juvenile	240	3	1,200	15
NC steelhead	Juvenile	578	6	2,890	30
NC steelhead	Adult	3	0	15	0

Total Amount of Take

Combined, there are 4,734 individual SONCC coho salmon; 1,200 individual CC Chinook salmon; and 2,936 individual NC steelhead expected to be taken by the Project in the form of capture and handling. There are individual 55 SONCC coho salmon; 15 individual CC Chinook salmon; and 37 individual NC steelhead expected to be killed.

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:

1. Ensure construction methods, minimization measures, and monitoring are properly implemented during and after construction.
2. Prepare and submit an annual report regarding the Project implementation.

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 or their designees shall allow any NMFS employee(s) or any other person(s) designated by NMFS, to accompany field personnel to visit the project site during activities described in this opinion.
    b. The Applicant or their contractor performing fish relocation shall contact NMFS 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. NMFS will review the activities resulting in take and determine if additional protective measures are required.
    c. 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.
    d. The Applicant shall ensure that any minimization measures described in the Proposed Federal Action section or supporting documents are properly implemented.
    e. The Applicant or their contractor performing post project fisheries monitoring will contact NMFS if exceeding the annual capture or mortality estimates described in Table 3. Contact NMFS via email at Matt.Goldsworthy@noaa.gov or by phone at (707) 825-1621.

2. The following terms and conditions implement reasonable and prudent measure 2:
    a. The Applicant shall provide a written report to NMFS by January 15 of each year. The report shall be sent to NMFS via email to Matt.Goldsworthy@noaa.gov or via mail to Matt Goldsworthy at 1655 Heindon Road, Arcata, California 95521. The report shall contain, at a minimum, the following information:
        i. 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.

ii. **Construction –** The report will present progress with construction and provide photographs of the reaches after construction and the subsequent monitoring of plantings and associated reporting.

iii. **Post Project Fisheries Monitoring** – The report will contain a summary of all of the sampling events by gear type, including species captured; disposition of species; explanation of mortalities; and any ancillary data. The report will be provided at the end of each of the five years of monitoring proposed.

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 initiation of formal consultation for the Cochran Creek and Quail Slough Fish Passage and Habitat Enhancement 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 the Pacific Coast Salmon Fishery Management Plan (FMP) developed by the Pacific Fisheries Management Council (PFMC 2014) 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 FMP that may be present in the action area. The Pacific Coast Salmon FMP contains EFH that will be adversely affected by the Project.

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 in the action area include:

1. Temporary reduction in water quality caused by increase in suspended sediments and turbidity.
2. Exposure of managed species to crushing and killing during construction.

3.3 Essential Fish Habitat Conservation Recommendations

Most of the adverse effects from the proposed action are temporary and minor. Overall, the Project will improve and enhance the quantity and quality of EFH in the action area. As described in the Effects of the Action section, thousands of individuals will be captured and subjected to monitoring and relocation, and small numbers of managed species will perish. Therefore, NMFS suggests the following Conservation Recommendations to minimize or compensate for the adverse effects:

1. Enlarge and expand the dimensions of the existing terminal (backwater) pond in

Quail Slough so that the increase in tidal prism throughout the project area can be maximized, and provide for additional benefits to marine and estuarine organisms.

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 effects the basis for NMFS' EFH Conservation Recommendations (50 CFR600.920(1)).

4 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended 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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