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

Consultation on the "Evaluation and Recommended Determination of a Tribal Research and Monitoring Plan Submitted for Consideration Under the Endangered Species Act's Tribal Plan Limit [50 CFR 223.204] for the Period September 18, 2019 – December 31, 2023" affecting Southern Oregon/Northern California coastal (SONCC) coho salmon in the West Coast Region

NMFS Consultation Number: WCRO-2019-02320
ARN: 151422WCR2019AR00122

Action Agency: NOAA's National Marine Fisheries Service (NMFS)

Table 1. Affected Species and NMFS' Determinations:

| ESA-Listed Species | Status | Is Action Likely to Adversely Affect Species? | Is Action Likely To Jeopardize the Species? | Is Action Likely to Adversely Affect Critical Habitat? | Is Action Likely To Destroy or Adversely Modify Critical Habitat? |
|---|---|---|---|---|---|
| SONCC coho salmon (*O. kisutch*) | Threatened | Yes | No | 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 | No | No |

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

**Issued By**:

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Assistant Regional Administrator
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**Date**: September 18, 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 with NMFS California Coastal Office in Arcata, California.

## 1.2 Consultation History

NMFS received a draft Tribal Fisheries Research and Monitoring Plan (YTFP 2014) on April 23, 2014, from the Yurok Tribal Fisheries Program (YTFP).  50 CFR 223.204 provides a limitation pursuant to Endangered Species Act (ESA) section 4(d) on the ESA section 9 take prohibitions for tribal resource management plans if the Secretary of Commerce (Secretary) determines that implementing the tribal plan will not appreciably reduce the likelihood of survival and recovery of listed salmonids (hereinafter referred to as the Tribal Plan Limit). The purpose of the rule that established the Tribal Plan Limit is to establish a process whereby the conservation needs of listed species are met while respecting Tribal rights, values, and needs and not abridge any treaties, rights, executive orders, or statutes (65 FR 42481 (July 10, 2000)). The YTFP submitted the draft for review under the Tribal Plan Limit. The rule recognizes the Secretary’s trust responsibilities to the Tribes and reinforces the commitment to government-to-government relations expressed in, among other things, Secretarial Order 3206. In making the determination whether implementation of the tribal plan will not appreciably reduce the likelihood of survival and recovery of listed salmonids, the Tribal Plan Limit provides that the Secretary shall use the best available biological data (including any tribal data and analysis) to determine the tribal plan’s impact on the biological requirements of the species, and will assess the effect of the tribal plan on survival and recovery, consistent with legally enforceable tribal rights and with the Secretary's trust responsibilities to tribes.

After NMFS received the draft tribal plan on April 23, 2014, several rounds of coordination between NMFS and YTFP followed. NMFS and YTFP worked together to complete an associated application for Tribal Plan Limit coverage in the NMFS Authorizations and Permits for Protected Species (APPS) website (https://apps.nmfs.noaa.gov/; APPS File 22590). On April 12, 2019, NMFS determined that the NOAA APPS application and an updated December, 2018 draft of the Yurok Tribal Fisheries Research and Monitoring Plan (Tribal Plan; YTFP 2018) were complete.

The Tribal Plan describes Yurok Tribal research and assessment activities in the lower Klamath River region that directly or indirectly affect coho salmon in the Southern Oregon/Northern California Coast (SONCC) Evolutionarily Significant Unit (ESU), which is listed as threatened under the ESA (70 FR 37160 (June 28, 2005)). Tribal resource management entities cooperate with the California Department of Fish and Wildlife (CDFW) and other state and local agencies in carrying out many of the activities. This Tribal Plan falls within the description of a "Tribal Plan" in the Tribal Plan Limit ("A Tribal Plan may include but is not limited to plans that address fishery harvest, artificial production, research, or water and land management, and may be developed by one tribe or jointly with other tribes" (50 CFR 223.204(b)(1)). As the Tribal Plan Limit specifies, NMFS regularly provided the Tribe with technical assistance during development of the Tribal Plan. We provided guidance on research to be covered under the Tribal Plan, exchanged information, and discussed what would be needed to help conserve SONCC coho salmon.

The Tribal Plan Limit requires the Secretary to seek comment on (and publish notice of the availability for) a recommended determination as to whether the implementation of the Tribal Plan will appreciably reduce the likelihood of survival and recovery of SONCC coho salmon. On July 12, 2019, NMFS completed an Evaluation and Pending Determination of the Tribal Plan. NMFS then published an associated notice of availability and request for public comment in the Federal Register (84 FR 35100 (July 22, 2019)). NMFS did not receive any public comments during the comment period, which ended at 5:00 p.m. Pacific time on August 21, 2019. NMFS then proceeded with finalizing the Evaluation and Recommended Determination of a Tribal Research and Monitoring Plan Submitted for Consideration Under the Endangered Species Act's Tribal Plan Limit [50 CFR 223.204] for the period September 18, 2019 – December 31, 2023.

## 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).

"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). NMFS has determined there are no interdependent or interrelated actions associated with the proposed action considered in this Opinion.

We are proposing to approve the Tribal Plan. NMFS has reviewed the Tribal Plan and determined that it meets the requirements of the Tribal Plan Limit. The Tribal Plan is consistent with the 4(d) limit for Tribal plans (50 CFR 223.204) and adequately minimizes the risk to SONCC coho salmon. Our review of the Tribal Plan is set out in the August XX, 2019 document entitled "Evaluation and Recommended Determination of a Tribal Resource Management Plan Submitted for Consideration Under the Endangered Species Act's Tribal Plan Limit [50 CFR 223.204] for the period January 1, 2017 – December 31, 2023" (Evaluation/Recommended Determination Document). The 4(d) limit would apply to the Tribal Plan for five years (through December 31, 2023).

The research and monitoring activities entail: (1) observation (e.g., snorkeling, spawning surveys); (2) capture (fyke nets, seine, electrofishing, outmigrant trapping, gill netting); (3) anesthetization, marking (freeze brand, fin clip), and tagging (floy tag, Passive Integrated Transponder (PIT) tag); and (4) non-lethal sampling for tissues and disease. During the five-year duration of the Tribal Plan (2019-2023), the YTFP may find it necessary to modify, add, or eliminate studies and, in such cases, the YTFP would do so through the NOAA APPS website (https://apps.nmfs.noaa.gov/index.cfm). NMFS would evaluate those changes and determine if they met the requirements of the Tribal Plan Limit. Further, NMFS will require annual reports on each project covered by the Tribal Plan by January 31st of the following year.

The specific research projects and related take estimates are described in detail in the Tribal Plan, and in the associated application on the NOAA APPS website. Additionally, NMFS' Evaluation/ Recommended Determination Document contains a summary of the proposed activities, gives details about the types and levels of anticipated take, and analyzes the research activities' effects on the biological requirements of the species.

The proposed Federal action regarding this authorization is for NMFS to approve the Tribal Plan. As the action agency, NMFS is responsible for complying with section 7 of the ESA, which requires Federal agencies to ensure any actions they fund, permit, or carry out are not likely to jeopardize listed species' continued existence nor destroy or adversely modify their critical habitat. This consultation examines the effects of the proposed research on SONCC coho salmon. Therefore, this consultation fulfills NMFS's section 7 consultation obligations for those species.

# 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.

## 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.

The ESA defines species to include "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." NMFS adopted a policy that a population or group of populations is considered an ESU if it is "substantially reproductively isolated from conspecific populations," and if it represents "an important component of the evolutionary legacy of the species." The policy equates an ESU with a DPS. Hence, the SONCC coho salmon listing unit in this biological opinion constitutes an ESU of the species *O. kisutch.* The ESU includes natural-origin populations and hatchery populations.

### 2.2.1 Species Description and General Life History

SONCC 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. 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.

### 2.2.2 Status of Species and Critical Habitat

In this 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 the most recent status review for SONCC coho salmon (Williams et al. 2016a) to determine the general condition of each population and factors responsible for the current status of the ESU. We use these population viability parameters as surrogates for reproduction, numbers, and distribution; the criteria found within the regulatory definition of "jeopardize the continued existence of" (50 CFR 402.02). This 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.

### 2.2.2.1 Status of SONCC Coho Salmon

#### 2.2.2.1.1 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 previous status review (Williams et al. 2011) for populations in this ESU (Williams et al. 2016a). 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. The productivity of a population (i.e., production over the entire life cycle) can reflect conditions (e.g., environmental conditions) that influence the dynamics of a population and determine abundance. In general, declining productivity equates to declining population abundance. Available data show that the 95 percent confidence intervals for the slope of the regression line include zero for many populations in the SONCC coho ESU, indicating that whether the productivity is decreasing, increasing, or stable cannot be determined (McElhany et al. 2000, NMFS 2014).

While data on SONCC coho salmon abundance is not available for all populations, adult escapement estimates have been generated for some populations in some years (Table 3). Although estimates of natural origin juvenile SONCC coho salmon production are not available, it is possible to make rough estimates of juvenile abundance from adult return data and redd estimates, where available. Quinn (2005) published estimates for salmonids in which average fecundity for coho salmon is 2,878 eggs per female. By applying the average fecundity of 2,878 eggs per female to the estimated 6,036 females returning (calculated by summing redd estimates (where available) with one half of the natural spawner estimates), approximately 17.4 million eggs may be expected to be produced annually. Nickelson and Lawson (1998) found survival of coho salmon from egg to parr in Oregon coastal streams to be around seven percent. Thus, we can estimate that the ESU could produce roughly 1,215,945 juvenile natural SONCC coho salmon each year. In addition, three artificial propagation programs currently produce SONCC coho salmon. The annual juvenile production goals for those programs are described in Table 4, and indicate hatchery managers could produce approximately 775,000 listed hatchery juvenile coho salmon each year.

Table 3. Estimates of hatchery and natural origin adult coho salmon, or redd estimates, for some of the populations in the SONCC coho salmon ESU, and their three-year average of most recent data.

| | **Rogue River**[1] | | **Smith River**[2] | **Redwood Creek**[3] | **Trinity River**[4] | | **Klamath River**[5] | | | | **Humboldt Bay Tributaries**[6] | **South Fork Eel River**[7] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | **Hatchery** | **Natural** | **Natural (redd estimates)** | **Natural** | **Hatchery** | **Natural** | **Iron Gate Hatchery** | **Bogus Creek - Natural** | **Shasta River - Natural** | **Scott River - Natural** | **Natural (redd estimates)** | **Natural (redd estimates)** |
| 2008 | 158 | 414 | | | 5,188 | 4,794 | 1,296 | 111 | 30 | 62 | | |
| 2009 | 518 | 2,566 | | | 3,351 | 3,045 | 70 | 6 | 9 | 81 | | |
| 2010 | 753 | 3,671 | | 373 | 4,425 | 3,522 | 485 | 154 | 44 | 911 | | |
| 2011 | 1,157 | 4,545 | | 322 | 4,784 | | 586 | 142 | 62 | 344 | 1,099 | 1,284 |
| 2012 | 1,423 | 5,474 | 609 | 803 | 4,810 | | 644 | 182 | 115 | 201 | 1,738 | 1,873 |
| 2013 | 1,999 | 11,210 | 306 | 747 | 6,631 | 4,457 | 1,268 | 405 | 134 | 2731 | 763 | 1,340 |
| 2014 | 829 | 2,409 | 260 | | 3,274 | 1,111 | 384 | 94 | 46 | 485 | 630 | 939 |
| 2015 | 1,620 | 4,051 | 149 | | 3,040 | 819 | 72 | 14 | 45 | 212 | 1,632 | 2,069 |
| 2016 | 1,201 | 6,266 | 186 | | | | | 85 | 52 | 227 | 617 | 416 |
| 2017 | 886 | 4,506 | 91 | | | | | 44 | 41 | 382 | | 465 |
| 2018 | | | 109 | | | | | 23 | 39 | 681 | | 1,633 |
| **Average**[8] | **1,236** | **4,941** | **129** | **624** | **4,315** | **2,129** | **575** | **51** | **44** | **430** | **960** | **838** |

[1] (ODFW 2018)
[2] (Garwood and Larson 2014, Walkley and Garwood 2015, 2017), redd survey data
[3] (Metheny and Duffy 2014)
[4] CDFW, unpublished data
[5] CDFW, unpublished data
[6] (Anderson and Ward 2016), redd survey data
[7] (PSMFC 2019), redd survey data
[8] Three-year average of most recent available years data.

Table 4. SONCC coho salmon listed hatchery annual juvenile production targets.

| Hatchery Program | Location (state) | Listed Hatchery Intact Adipose | Listed Hatchery Adipose Clipped |
|---|---|---|---|
| Cole Rivers Hatchery | Rogue River (Oregon) | 0 | 200,000 |
| Trinity River Hatchery | Trinity River (California) | 500,000 | 0 |
| Iron Gate Hatchery | Klamath River (California) | 75,000 | 0 |

2.2.2.1.2 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. 2016a). 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 Critical Habitat

In designating critical habitat for the SONCC coho salmon ESU, NMFS identified the following five essential habitat types (PBFs): (1) juvenile summer and winter rearing areas; (2) juvenile migration corridors; (3) areas for growth and development to adulthood; (4) adult migration corridors; and (5) spawning areas. Within these areas, essential features of coho salmon critical habitat include adequate: (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions (64 FR 24049 (May 5, 1999)). The condition of SONCC coho salmon 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: overfishing, artificial propagation, 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, 70 FR 37160 (June 28, 2005), 64 FR 24049 (May 5, 1999)).

### 2.2.2.3 Factors Related to the Decline of Species and Degradation of Critical Habitat

The factors, many of which are noted above under *Status of Critical Habitat*, that caused declines 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. 2016b). 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 of SONCC coho salmon (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 both the El Nino in 2015 and 2016, and the existence of a northeast Pacific marine warming phenomenon, in 2013 through 2015, referred to as “the blob” (Cavole et al. 2016). Reduced flows can cause increases in water temperature, resulting in increased heat stress to fish and thermal barriers to migration.

New information since this SONCC coho salmon ESU was listed suggests that the earth’s climate is warming, and that this change could significantly impact ocean and freshwater habitat conditions (Intergovernmental Panel on Climate Change 2014), which affects survival of coho salmon. Of all the Pacific salmon species, coho salmon are likely one of the most sensitive to climate change due to their extended freshwater rearing. Additionally, the SONCC coho salmon ESU is near the southern end of the species’ distribution and many populations reside in degraded streams that have water temperatures near the upper limits of thermal tolerance for coho salmon.

Average annual Northwest air temperatures have increased by approximately 1°C since 1900, or about 50 percent more than the global average warming over the same period (Independent Scientific Advisory Board 2007). The latest climate models project a warming of 0.1°C to 0.6°C per decade over the next century. According to the Independent Scientific Advisory Board’s (ISAB) recurring reports (https://www.nwcouncil.org/fw/isab/), these effects may have the following physical impacts within approximately the next 40 years:

- Warmer air temperatures will result in a shift to more winter/spring rain and runoff, rather than snow that is stored until the spring/summer melt season.

- With a shift to more rain and less snow, snowpack will diminish in those areas that typically accumulate and store water until the spring/summer melt season.

- With a smaller snowpack, these watersheds will see their runoff diminished and exhausted earlier in the season, resulting in lower stream flows in the June through September period.

- River flows in general and peak river flows are likely to increase during the winter due to more precipitation falling as rain rather than snow.

For Northern California and southern Oregon, most models project heavier and warmer precipitation. Extreme wet and dry periods are projected, increasing the risk of both flooding and droughts (DWR 2013). Annual precipitation could increase by up to 20 percent over northern California. A greater proportion of precipitation events occurring during the mid-winter months is likely to occur as intense rain and rain-on-snow events that are likely to lead to higher numbers of landslides and greater and more severe floods (Luers et al. 2006, Doppelt et al. 2008). Overall, there will be earlier and lower low-flows and earlier and higher high-flows. Increased flooding is likely to scour salmon eggs from their redds and displace overwintering juveniles, while lower low flows are likely to increase summer water temperatures and decrease available salmon habitat.

Water temperature is likely to increase overall, with higher maximum temperatures along with higher minimum temperatures in streams. Increases in winter and spring temperature regimes are likely to include, but are not limited to, depletion of cold water habitat, variation in quality and quantity of tributary rearing habitat, alterations to migration patterns, accelerated embryo development, premature emergence of fry, increased bio-energetic and disease stresses on fish, and increased competition among species. In addition, the increase in summer water temperatures are likely to be especially dramatic since flows in many streams are expected to continue decreasing as a result of decreasing snowpack (Luers et al. 2006, Crozier et al. 2008, Doppelt et al. 2008, Crozier 2016). This loss of snowpack will continue to create lower spring and summertime flows while additional warming will cause earlier onset of runoff in streams.

Marine ecosystems and habitats important to juvenile and adult salmonids are likely to experience changes in temperatures, circulation, water chemistry, and food supplies (Feely 2004, Osgood 2008, Turley 2008, Abdul-Aziz et al. 2011, Doney et al. 2012). These changes are likely to have deleterious impacts on coho salmon growth and survival while at sea. Ocean acidification also has the potential to affect the phytoplankton community due to the likely loss of most calcareous shell-forming species such as pteropods (Crozier 2016). Related direct effects to coho salmon likely include decreased growth rates due to ocean acidification and increased metabolic costs due to the rise in sea surface temperature (Portner and Knust 2007).

The threat to coho salmon from global climate change will increase in the future. In general, conditions in the climate and within the ecosystems on which coho salmon rely will change dramatically over the next several decades. Climate change is having, and will continue to have, an impact on salmonids throughout the Pacific Northwest and California (Crozier 2016). Overall, climate change represents a growing threat for the SONCC coho salmon ESU, and will challenge the resilience of coho salmon (NMFS 2014).

## 2.3 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The proposed research and monitoring will occur along the Klamath River between the river mouth (RM 0) and Iron Gate Dam (RM 190), and along several tributaries therein, including: Terwer Cree, Blue Creek, Waukell Creek, Hunter Creek, Salt Creek, McGarvey Creek, Panther Creek, Spruce Creek, Ah Pah Creek, Tectah Creek, Wilson Creek, Lagoon Pond, Bear Creek, Tarup Creek, Red Cap Creek, Richardson Creek ponds, and others.

In all cases, the proposed research activities would take place in individual, small sites. For example, the researchers might electrofish a few hundred feet of river, deploy a beach seine covering a few hundred square feet of stream, or operate a screw trap in a few tens of square feet of habitat.

## 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).

While the Status of SONCC coho salmon section discussed the viability of the SONCC coho salmon ESU as a whole, this section will focus on the condition of SONCC coho salmon and their critical habitat in the action area, and factors affecting their condition within the action area, which includes the mainstem Klamath River from Iron Gate Dam to the Pacific Ocean, and several tributaries outlined the Action Area section.

Coho salmon were once numerous and widespread within the Klamath River basin (Snyder 1931). Today, due to migration barriers, habitat degradation, and other factors, the small populations that remain occupy a fraction of their historical area, in limited habitat within the tributary watersheds (i.e., Shasta River, Scott River, and Salmon River) and the mainstem Klamath River just below IGD (NRC 2004).

Coho salmon in the action area occupy temperate coastal regions and arid inland areas stretching an approximated 190.1 river miles from IGD downstream to the estuary. Coho salmon in the action area belong to two (i.e., the Interior Klamath and the Lower Klamath) of the seven diversity strata that comprise the SONCC coho salmon ESU. All five populations of the Interior Klamath Diversity Stratum, and one population of the Lower Klamath River Diversity Stratum, occur in the action area). Populations in the action area include: the Upper Klamath River (comprised of tributaries and mainstem Klamath River from the mouth of Portuguese Creek at RM 128 upstream to IGD at RM 190 excluding the Shasta and Scott Rivers), the Middle Klamath River (comprised of tributaries and mainstem Klamath River from the Trinity River confluence at RM 43 upstream to the mouth of Portuguese Creek excluding the Salmon River), the Lower Klamath River (comprised of tributaries and mainstem Klamath River downstream of the Trinity River confluence to the Klamath River mouth at RM 43), the Salmon River (RM 66), the Scott River (RM 144), and the Shasta River (RM 177).

### 2.4.1 Status of Critical Habitat in the Action Area

Some critical habitat is designated in the Action Area (64 FR 24049 (May 5, 1999)). Habitat attributes that are of concern when considering effects to critical habitat include water quality, water temperature, dissolved oxygen, nutrients, suspended sediment, migratory habitat conditions, rearing and spawning habitat conditions, etc. However, for the majority of the work being contemplated here, the physical result of activities in the action area are indistinguishable from those effects described in the previous section on the species' rangewide status. Further, the actions considered in this opinion are minimally intrusive in terms of their effect on habitat because they would involve very little, if any, disturbance of flow, water quality, streambeds or adjacent riparian zones. None of the activities will measurably affect any habitat PBF listed earlier. Therefore, those attributes are not described in detail here.

### 2.4.2 Status of Coho Salmon in the Action Area

The biological requirements of SONCC ESU coho salmon in the action area vary depending on the life history stage present at any given time (Spence et al. 1996, Moyle 2002). Generally, during salmonid spawning migrations, adult salmon prefer clean water with cool temperatures and access to thermal refugia, dissolved oxygen near 100 percent saturation, low turbidity, adequate flows and depths to allow passage over barriers to reach spawning sites, and sufficient holding and resting sites. Anadromous fish select spawning areas based on species-specific requirements of flow, water quality, substrate size, and groundwater upwelling (Sandercock 1991). Embryo survival and fry emergence depend on substrate conditions (e.g., gravel size, porosity, permeability, and dissolved oxygen concentrations), substrate stability during high flows, and, for most species, water temperatures of 14 ºC or less (Quinn 2005).

2.4.2.1 Periodicity and Distribution

This section describes the periodicity and distribution of various life-stages of SONCC coho salmon in the action area. Figure 1 summarizes the seasonal periodicities of coho salmon further described below in this section.

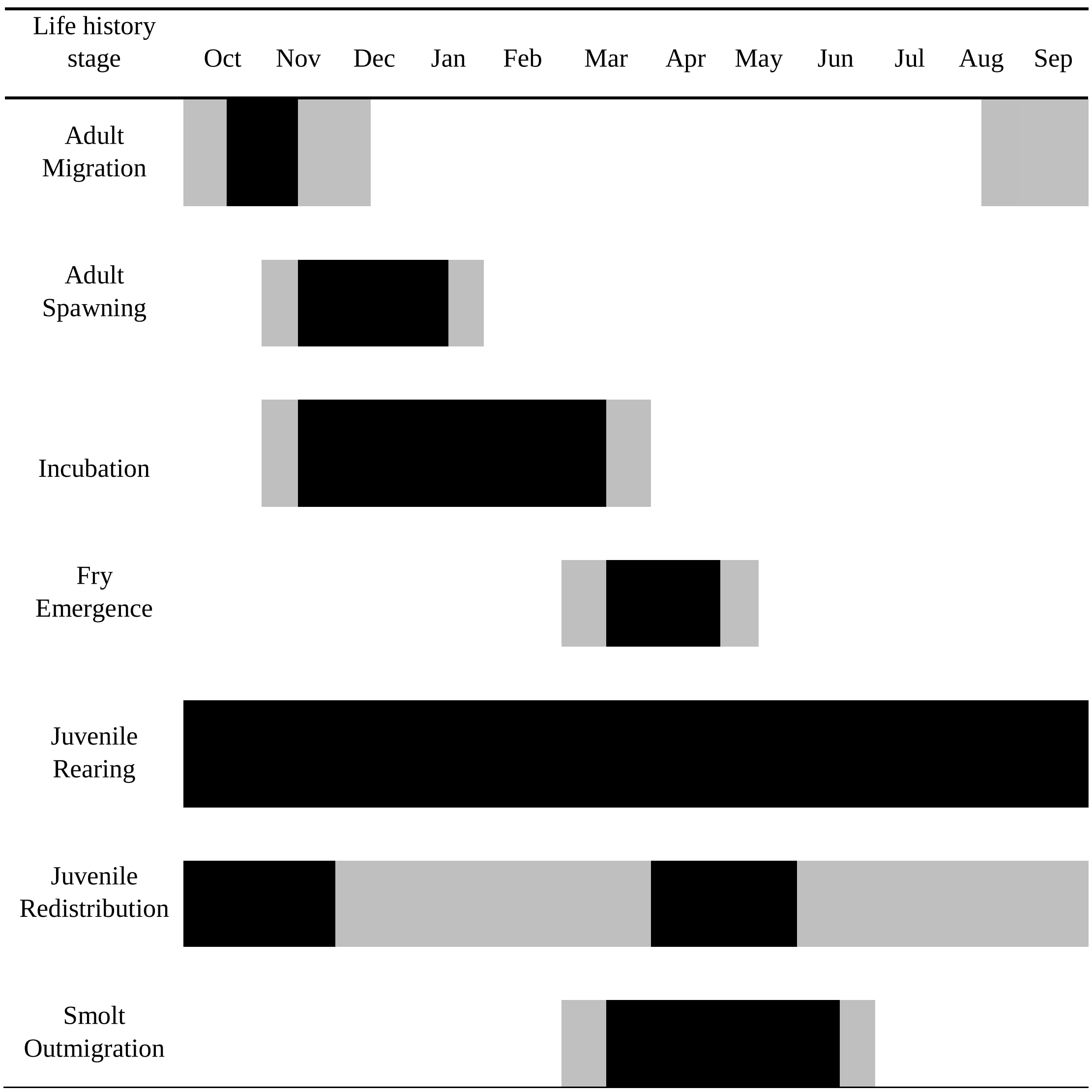


Figure 1. Life stage periodicities for coho salmon within the Klamath River Basin. Black areas represent peak use periods, those shaded gray indicate non-peak periods (Leidy and Leidy 1984, NRC 2004, Justice 2007, Carter and Kirk 2008).

#### 2.4.2.1.1 Adult migration and spawning

Adult coho salmon typically begin entering the Lower Klamath River in late September (but as early as late August in some years), with peak migration occurring in mid-October (Ackerman et al. 2006). They move into the portion of the mainstem from IGD to Seiad Valley from the late fall through the end of December. Many returning adults seek out spawning habitat in sub-basins, such as the Scott, Shasta and Trinity rivers, as well as smaller mainstem tributaries throughout the basin with unimpeded access, functional riparian corridors and clean spawning gravel. Coho salmon have been known to migrate at water temperatures up to 19ºC in the Klamath River (Strange 2010). Coho salmon spawning within the Klamath River basin usually commences within a few weeks after arrival at the spawning grounds (NRC 2004) between November and January (Leidy and Leidy 1984).

Coho salmon spawning has been documented in low numbers as early as November 15 within the mainstem Klamath River. From 2001 to 2005, Magneson and Gough (2006) documented a total of 38 coho salmon redds (egg “nests” within streambed gravels) between IGD (RM 190) and the Indian Creek confluence (RM 109), although over two-thirds of the redds were found within 12 RM of the dam.

#### 2.4.2.1.2 Egg Incubation and Fry Emergence

Coho salmon eggs typically hatch within 8 to 12 weeks following fertilization, although colder water temperatures may lengthen the process (Bjornn and Reiser 1991). Upon hatching, coho salmon alevin (newly hatched fish with yolk sac attached) remain within redds for another 4 to 10 weeks, further developing while subsisting off their yolk sac. Once most of the yolk sac is absorbed, the 30 to 50 millimeter fish (then termed “fry”) begin emerging from the gravel in search of shallow stream margins in which they can forage safely (NRC 2004). Within the Klamath River, fry begin emerging in mid-February and continue through mid-May (Leidy and Leidy 1984).

#### 2.4.2.1.3 Juvenile Rearing

##### 2.4.2.1.3.1 Parr

Some coho salmon parr redistribute following the first fall rain freshets, when fish seek stream areas conducive to surviving high winter flows (Ackerman et al. 2006, Soto et al. 2008, Hillemeier et al. 2009). The YTFP and the Karuk Tribal Fisheries Program (KTFP) have been monitoring juvenile coho salmon movement in the Klamath River using passive integrated transponder (PIT) tags. Some coho salmon parr tagged by KTFP have been recaptured in ponds and sloughs over 90 river miles away in the lower 6-7 miles of Klamath River (Voight 2008). The PIT tagged fish appear to leave the locations where they were tagged in the fall or winter following initial fall freshets, before migrating downstream in the Klamath River to off-channel ponds near the estuary where they are thought to remain and grow before emigrating as smolts the following spring (Voight 2008). Several of the parr (~65 mm) that were tagged at locations like Independence Creek (RM 95), were recaptured at the Big Bar trap (RM 51), which showed pulses of emigrating coho salmon during the months of November and December following rainstorms (Soto et al. 2008). Some PIT-tagged parr traveled from one stream and swam up another, making use of the mainstem Klamath during late summer cooling events. Summer cold fronts and thunderstorms can lower mainstem temperatures, making it possible for juvenile salmonids to move out of thermal refugia during cooling periods in the summer (Sutton et al. 2004).

Juvenile coho salmon (parr and smolts) have been observed residing in thermal refugia areas within the mainstem Klamath River downstream of IGD within the Upper Klamath River population unit throughout the summer and early fall, during periods of high ambient water temperatures (>22ºC). Mainstem refugia areas are often located near tributary confluences, where water temperatures are 2 to 6°C lower than the surrounding river environment (NRC 2004, Sutton et al. 2004). Habitat conditions of refugia zones are not always conducive for coho salmon because several thousand fish can be crowded into small areas, leading to predator aggregation, increasing competition, and thereby triggering density dependent mechanisms. Robust numbers of rearing coho salmon have been documented within Beaver and Tom Martin creeks, whereas juvenile coho salmon have not been documented, or documented in very small numbers, utilizing cold water refugia areas within the Middle and Lower Klamath population units (Sutton et al. 2004). No coho salmon were observed within extensive cold-water refugia habitat adjacent to lower river tributaries such as Elk Creek (RM 107), Red Cap Creek (RM 53), and Blue Creek (RM 16) during past refugia studies (Sutton et al. 2004). However, Naman and Bowers (2007) captured 15 wild coho salmon ranging in size from 66 mm to 85 mm in the Klamath River between Pecwan and Blue creeks near cold water seeps and thermal refugia during June and July of 2007.

#### 2.4.2.1.3.2 Juvenile outmigration

Migrating smolts are usually present within the mainstem Klamath River between February and the beginning of July, with April and May representing the peak migration months. Migration rate tends to increase as fish move downstream (Stutzer et al. 2006). Yet, some coho salmon smolts may stop migrating entirely for short periods of time if factors such as water temperature inhibit migration. Within the Klamath River, at least 11 percent of wild coho salmon smolts exhibited rearing-type behavior during their downstream migration (Stutzer et al. 2006). Salmonid smolts may further delay their downstream migration by residing in the lower river and/or estuary (Voight 2008). Sampling indicates coho salmon smolts are largely absent from the Klamath River estuary by July (NRC 2004). Peak emigration timing varies throughout the basin from April until July, depending on the system and the age class of fish moving (Beamish et al. 2000, Beeman et al. 2008). Many coho salmon parr migrate downstream from the Shasta River and into the mainstem Klamath River during the spring months after emergence and a brief (<3 month) rearing period in the Shasta River (Chesney 2007). In several different years, personnel from CDFW noticed a distinct emigration of 0+ (sub yearling, ≤1 year of age) smolts around the week of May 21 on the Shasta River. Analysis of scales samples indicates that most of these fish are less than one year old (Chesney et al. 2007). Unlike the 0+ coho parr in the canyon that are leaving the Shasta River due to loss of habitat, these fish appear to be smolting.

#### 2.4.2.2 Abundance

Robust abundance estimates are not available for all populations of coho salmon in the action area. However, population estimates of adult coho salmon in the action area that are available (See Table 4, Trinity and Klamath River basins) are all reduced from historic numbers and are all estimated to be below the viability threshold each year since 2009.

## 2.5 Effects of the Action

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

### 2.5.1 Effects to SONCC Coho Salmon ESU Critical Habitat

Full descriptions of effects of the proposed activities are found in the following section. In general, the activities would be (1) electrofishing, (2) capturing fish with angling equipment, traps, and nets of various types, (3) collecting biological samples from live fish, and (4) collecting tissues or deceased fish for biological sampling. All of these techniques are minimally intrusive in terms of their effect on habitat because they would involve very little, if any, disturbance of water quality, water flow, streambeds or adjacent riparian zones. None of the activities will measurably affect any habitat PBF listed earlier. Moreover, the proposed activities are all of short duration. Therefore, we conclude that the proposed activities are not likely to have an adverse impact on any designated critical habitat.

### 2.5.2 Effects to SONCC Coho salmon Individuals

The primary effect of the proposed research will be on the listed species in the form of capturing and handling the fish. Harassment caused by capturing, handling, and releasing fish generally leads to stress and other sub-lethal effects, but the fish do sometimes die from such treatment.
The following subsections describe the types of activities being proposed. Each is described in terms broad enough to apply to the entire Tribal Plan. The activities would be carried out by trained professionals using established protocols. The effects of the activities are well documented and discussed in detail below.

#### 2.5.2.1 Capture/handling

Any physical handling or 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 river 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 18ºC 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). Debris buildup at traps can also kill or injure fish if the traps are not monitored and cleared regularly. The APPS application identifies 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.

#### 2.5.2.2 Electrofishing

Electrofishing is a process by which an electrical current is passed through water containing fish in order to stun them—thus making them easy to capture. It can cause a suite of effects ranging from simply disturbing the fish to actually killing them. The amount of unintentional mortality attributable to electrofishing varies widely depending on the equipment used, the settings on the equipment, and the expertise of the technician. Electrofishing can have severe effects on adult salmonids. Spinal injuries in adult salmonids from forced muscle contraction have been documented. Sharber and Carothers (1988) reported that electrofishing killed 50 percent of the adult rainbow trout in their study.

Most of the studies on the effects of electrofishing on fish have been conducted on adult fish greater than 300 mm in length (Dalbey et al. 1996). The relatively few studies that have been conducted on juvenile salmonids indicate that spinal injury rates are substantially lower than they are for large fish. Smaller fish are subjected to a lower voltage gradient than larger fish (Sharber and Carothers 1988) and may therefore be subject to lower injury rates (e.g., Hollender and Carline 1994, Dalbey et al. 1996, Thompson et al. 1997). McMichael (1998) found a 5.1% injury rate for juvenile Middle Columbia River steelhead captured by electrofishing in the Yakima River Subbasin. The incidence and severity of electrofishing damage is partly related to the type of equipment used and the waveform produced (Sharber and Carothers 1988, McMichael 1993, Dalbey et al. 1996, Dwyer and White 1997). Continuous direct current (DC) or low-frequency (30 Hz) pulsed DC have been recommended for electrofishing (Dalbey et al. 1996, Snyder 2003) because lower spinal injury rates, particularly in salmonids, occur with these waveforms (McMichael 1993, Sharber 1994, Dalbey et al. 1996). Only a few studies have examined the long-term effects of electrofishing on salmonid survival and growth (Dalbey et al. 1996, Ainslie et al. 1998). These studies indicate that although some of the fish suffer spinal injury, few die as a result. However, severely injured fish grow at slower rates and sometimes they show no growth at all (Dalbey et al. 1996).

NMFS' electrofishing guidelines (NMFS 2000) will be followed in all electrofishing surveys. The guidelines require that field crews be trained in observing animals for signs of stress and shown how to adjust electrofishing equipment to minimize that stress. All areas are visually searched for fish before electrofishing may begin. Electrofishing is not done in the vicinity of redds or spawning adults. All electrofishing equipment operators are trained by qualified personnel to be familiar with equipment handling, settings, maintenance, and safety. Operators work in pairs to increase both the number of fish that may be seen and the ability to identify individual fish without having to net them. Working in pairs also allows the researcher to net fish before they are subjected to higher electrical fields. Only DC units are used, and the equipment is regularly maintained to ensure proper operating condition. Voltage, pulse width, and rate are kept at minimal levels and water conductivity is tested at the start of every electrofishing session so those minimal levels can be determined. Due to the low settings used, shocked fish normally revive instantaneously. Fish requiring revivification receive immediate, adequate care. In all cases, electrofishing is used only when other survey methods are not feasible.

The preceding discussion focused on the effects of using a backpack unit for electrofishing and the ways those effects would be mitigated. In larger streams and rivers, however, electrofishing units are sometimes mounted on boats or rafts. These units often use more current than backpack electrofishing equipment because they need to cover larger (and deeper) areas and, as a result, can have a greater impact on fish. In addition, the environmental conditions in larger, more turbid streams can limit researchers' ability to minimize impacts on fish. That is, in areas of lower visibility it can be difficult for researchers to detect the presence of adults and thereby take steps to avoid them. In any case, all researchers intending to use boat electrofishing would use all means at their disposal to ensure that a minimum number of fish are harmed.

2.5.2.3 Outmigrant traps

Smolt traps, including rotary screw traps, juvenile fyke traps, and pipe traps, are generally used to obtain information on natural population abundance and productivity. On average, they achieve a sample efficiency of 4 to 20 percent of the emigrating population from a river or stream--depending on river size. Although under some conditions traps may achieve a higher efficiency for a relatively short period of time. Based on years of sampling at hundreds of locations under hundreds of scientific research authorizations, we would expect the mortality rates for fish captured at rotary screw type traps to be one percent or less.

The trapping, capturing, or collecting and handling of juvenile fish using traps is likely to cause some stress on listed fish. However, fish typically recover rapidly from handling procedures. The primary factors that contribute to stress and mortality from handling are excessive doses of anesthetic, differences in water temperature, dissolved oxygen conditions, the amount of time that fish are held out of water, and physical trauma. Stress on salmonids increases rapidly from handling if the water temperature exceeds 64.4 degrees F (18 degrees C) or if dissolved oxygen is below saturation. Additionally, stress can occur if there are more than a few degrees difference in water temperature between the stream/river and the holding tank.

The potential for unexpected injuries or mortalities among listed fish is reduced in a number of ways. These can be found in the individual study protocols stated earlier. In general, screw traps are checked at least daily and usually fish are handled in the morning. This ensures that the water temperature is at its daily minimum when fish are handled. Also, fish may not be handled if the water temperature exceeds 69.8 degrees Fahrenheit (21 degrees C). Great care must be taken when transferring fish from the trap to holding areas and the most benign methods available are used—often this means using sanctuary nets when transferring fish to holding containers to avoid potential injuries. The investigators' hands must be wet before and during fish handling. Appropriate anesthetics must be used to calm fish subjected to collection of biological data. Captured fish must be allowed to fully recover before being released back into the stream and will be released only in slow water areas. And often, several other stringent criteria are applied on a case-by case basis: safety protocols vary by river velocity and trap placement, the number of times the traps are checked varies by water and air temperatures, the number of people working at a given site varies by the number of outmigrants expected, etc. All of these protocols and more are used to make sure the mortality rates stay at one percent or lower.

2.5.2.4 Tissue Sampling/Tagging/Marking

Techniques such as fin-clipping, Passive Integrated Transponder (PIT) tagging, and the use of radio transmitters are common to many scientific research efforts using listed species. All sampling, handling, and tagging procedures have an inherent potential to stress, injure, or even kill the marked fish. This section discusses each of the marking processes and its associated risks.

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

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

Regardless, any time researchers clip or remove fins, it is necessary that the fish be handled. Therefore, the same safe and sanitary conditions required for tissue sampling operations also apply to tagging and marking activities.

A PIT tag is an electronic device that relays signals to a radio receiver; it allows salmonids to be identified whenever they pass a location containing such a receiver without researchers having to handle the fish again, or by researchers possessing hand-held PIT tag scanners. The tag is inserted into the body cavity of the fish just in front of the pelvic girdle. YTFP researchers engaged in tagging will follow the procedures in the application to ensure that the operations take place in the safest possible manner. In general, the tagging operations will take place where there is cold water of high quality, a carefully controlled environment for administering anesthesia, sanitary conditions, quality control checking, and a carefully regulated holding environment where the fish can be allowed to recover from the operation.

When inserted using best practices, including proper fish size relative to PIT tag length, PIT tags have shown little effect on growth, mortality, or behavior (Prentice et al. 1990, Acolas et al. 2007). For example, Hockersmith et al. (2000) concluded that the performance of yearling chinook salmon was not adversely affected by gastrically- or surgically-implanted sham radio tags or PIT- tags. However, Knudsen et al. (2009) did find a significant effect of PIT-tagging on hatchery origin spring-run Chinook salmon, and caution that PIT tag effects should be considered when conducting studies using PIT tags.

#### 2.5.2.5 Observing/Harassing

For some parts of the proposed studies, listed fish would be observed in-water (e.g., by snorkel surveys or from the banks). Direct observation is the least disruptive method for determining a species' presence/absence and estimating their relative numbers. Its effects are also generally the shortest-lived and least harmful of the research activities discussed in this section because a cautious observer can effectively obtain data while only slightly disrupting the fishes' behavior. Fry and juveniles frightened by the turbulence and sound created by observers are likely to seek temporary refuge in deeper water or behind or under rocks or vegetation. In extreme cases, some individuals may leave a particular pool or habitat type and then return when observers leave the area. At times the research involves observing adult fish—which are more sensitive to disturbance. During some of the research activities discussed below, redds may be visually inspected, but would not be walked on. Harassment is the primary form of take associated with these observation activities, and few if any injuries (and no deaths) are expected to occur—particularly in cases where the researchers observe from the stream banks rather than in the water. Because these effects are so small, there is little a researcher can do to mitigate them except to avoid disturbing sediments, gravels, and, to the extent possible, the fish themselves, and allow any disturbed fish the time they need to reach cover.

#### 2.5.2.6 Effect of Proposed Take

In previous sections, we estimated the annual abundance of adult and juvenile listed salmonids and eulachon. Since there are no measurable habitat effects, the analysis will consist primarily of examining directly measurable impacts on abundance. Abundance effects stand on their own and can be tied directly to productivity effects and less directly to structure and diversity effects. The effect of the action is measured in terms of its impact on the relevant species' total abundance by origin and life stage (Table 5).

Table 5. Estimated annual abundance of SONCC coho salmon by origin and life stage.

| Origin | Life Stage | Estimated Annual Abundance |
|---|---|---|
| Natural | Adult | 12,457 |
| | Juvenile | 1,215,945 |
| Hatchery[9] | Adult | 6,125 |
| | Juvenile | 775,000 |

The specific projects and related take estimates are described above, and in greater detail in the Tribal Plan and in Application 22590 on the NOAA APPS website. Those records are incorporated in full herein. The YTFP would conduct, oversee, or coordinate eight projects that could take SONCC coho salmon. Most of the captured juvenile fish would be variously marked, tagged, or tissue sampled and released, whereas most of the adult fish would be briefly handled

[9] For this analysis adipose clipped and intact adipose hatchery origin fish are combined. All hatchery-origin SONCC coho salmon in the action area are intact adipose hatchery fish.

and released. However, any fish handling carries an inherent potential for causing or promoting stress, disease, injury, or death of the specimen. We have summarized the total proposed take in Table 6.

Table 6. Summary of proposed annual capture take and mortalities of SONCC coho salmon.

| Life Stage | Origin | Take Action | Proposed Take | Proposed Mortalities |
|---|---|---|---|---|
| Adult | Listed Hatchery | Capture/Handle/Release Fish | 60 | 1 |
| | Natural | Capture/Handle/Release Fish | 60 | 1 |
| Juvenile | Listed Hatchery | Capture/Handle/Release Fish | 1,620 | 17 |
| | Natural | Capture/Handle/Release Fish | 6,720 | 74 |
| | Listed Hatchery | Capture/Mark, Tag, Sample Tissue/Release Live Animal | 1,500 | 20 |
| | Natural | Capture/Mark, Tag, Sample Tissue/Release Live Animal | 11,500 | 23 |

As part of the application process, the YTFP included estimates of the number of adult and juvenile SONCC coho salmon that may be handled and killed annually, as indicated in Table 6. Additionally, to account for the dynamic and potentially increasing scope of research that may annually affect listed SONCC coho salmon, we increased the proposed fish handling and lethal take numbers in this evaluation by 10%. Although it is difficult to anticipate how much more research may be requested in future years, NMFS believes this 10% buffer would be sufficient to include any changes or additions. Table 7 compares the total requested take, plus the 10% buffer, to the species' estimated abundance.

Table 7. Total proposed take and mortalities, plus the 10% buffer, compared to the estimated abundance of SONCC coho salmon.

| **Life Stage** | **Origin** | **Total proposed take plus 10%** | **Percent of ESU handled** | **Total proposed mortalities plus 10%** | **Percent of ESU killed** |
|---|---|---|---|---|---|
| Adult | Listed Hatchery | 66 | 1.08 | 1 | 0.02 |
| | Natural | 66 | 0.53 | 1 | 0.01 |
| Juvenile | Listed Hatchery | 3,432 | 0.44 | 41 | 0.01 |
| | Natural | 20,042 | 1.65 | 107 | 0.01 |

Because the majority of the fish that would be captured are expected to recover with no ill effects, the true effects of the proposed action are best seen in the context of the fish that are likely to be killed. To determine the effects of these losses, Table 7 compares the numbers of fish that may be killed to the total abundance numbers expected for the ESU. At the ESU level, the permitted activities may kill at most 0.01% of natural-origin juvenile and 0.02% natural-origin adult SONCC coho salmon. Therefore, the research would be a very small impact on the species' abundance, a likely similar impact on their productivity, and no measureable effect on their spatial structure or diversity.

An effect of the research that cannot be quantified is how it would help benefit and conserve the species. The included projects are intended to help to conserve, restore, and manage the fisheries resources of the Klamath Basin, including SONCC coho salmon, so that future generations of Yurok People can harvest from healthy fish populations. Decades of YTFP data collection throughout the Klamath Basin on life history, status, trends, habitat requirements, and other factors related to the fish species the Tribe depends upon, are intended to improve upon the information used in our decision making processes. Continued YTFP fisheries research stands to benefit SONCC coho salmon by increasing our understanding of population dynamics, life history characteristics and diversity, spawning, and habitat requirements and providing a long-term dataset by which to gage the relative needs, successes, and shortcomings of coho recovery and restoration efforts. While we expect these research actions to generate lasting benefits to conservation of the listed fish, we are not relying on any particular benefit in making our conclusion in section 2.7 below.

## 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).

### 2.6.1 Klamath Basin Agreements and Planned Dam Removals

In 2010, representatives of 45 organizations, including federal agencies, the states of California and Oregon, Indian tribes, counties, irrigators, and conservation and fishing groups of the

Klamath Basin negotiated the Klamath Basin Restoration Agreement (KBRA) to address the long-term needs of the Klamath Basin (KBRA 2010). The agreement intended to: 1) restore and sustain natural production and provide for full participation in harvest opportunities of fish species throughout the Klamath Basin, 2) establish reliable water and power supplies which sustain agricultural uses and communities and NWRs, and 3) contribute to the public welfare and the sustainability of all Klamath Basin communities. The agreement included a provision to support the Hydroelectric Settlement, which established a process for potential removal of four major dams on the Klamath River, namely: IGD, Copco No. 1 Dam, Copco No. 2 Dam, and J.C. Boyle Dam (KBRA 2010).

However, the KBRA required Congressional approval to provide legal authority and funding for many activities. Because congressional approval was never obtained, the KBRA subsequently expired in 2015. An Upper Klamath Basin Comprehensive Agreement was signed in April of 2014 to address KBRA commitments, but this agreement was terminated in 2017 following the expiration of the KBRA.

Separately, many of the same organizations negotiated with PacifiCorp (not a party to the KBRA) to arrive at the Klamath Hydroelectric Settlement Agreement (KHSA) in 2010. The KHSA established a framework for potential removal of four PacifiCorp-owned developments (J.C. Boyle, Copco I, Copco II, and Iron Gate) on the Klamath River downstream of Reclamation's Klamath Project and interim operations of the KHP. The KHSA was amended in 2016 (KHSA 2016). An integral component of the amended KHSA provided that PacifiCorp and the KRRC would jointly file an application with FERC or transfer of the license for the four developments from PacifiCorp to the KRRC, and the KRRC would file an application to surrender and remove the four developments.

On September 23, 2016, PacifiCorp and the KRRC submitted an application to the FERC to amend the existing license for the Klamath Hydroelectric Project, establish an original license for the Lower Klamath Project consisting of four developments, and transfer the original license for the Lower Klamath Project to the KRRC. At that time, the KRRC also applied to surrender the license for the Lower Klamath Project, including removal of the four developments. On October 5, 2017, FERC issued notice of the application for amendment and transfer of the license and soliciting comments, motions to intervene, and protests. However, FERC still has not issued such a notice on the surrender application yet. According to a Definite Plan that the KRRC submitted to FERC on June 28, 2018, decommissioning of the four developments is expected to commence on January 1, 2021. However, FERC has not yet submitted a biological assessment or requested initiation of formal consultation under Endangered Species Act section 7 with the Services on any federal action that it would take to decide whether to approve decommissioning of the four developments. As described above at the beginning of this Cumulative Effects Section, "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." Therefore, the effects of FERC's future action of deciding whether to decommission the four developments are not included in the cumulative effects for this Opinion. However, this information about the proposed dam removal and related settlement efforts is relevant as part of the overall context of this consultation, including the five-year period of the proposed action.

### 2.6.2 Control of Wildland Fires on Non-Federal Lands

Control of wildland fires may include the removal or modification of vegetation due to the construction of firebreaks or setting of backfires to control the spread of fire. This removal of vegetation can trigger post-fire landslides as well as chronic sediment erosion that can negatively affect downstream coho habitat. Also, the use of fire retardants may adversely affect salmonid habitat if used in a manner that does not sufficiently protect streams causing the potential for coho to be exposed to lethal amounts of the retardant. This exposure is most likely to affect summer rearing juvenile coho. As wildfires are stochastic events, NMFS cannot determine the extent to which suitable coho habitat may be removed or modified by these activities.

### 2.6.3 Residential Development and Existing Residential Infrastructure

Human population growth in the action area is expected to remain relatively stable over the next 10 years as California’s economy continues to recover from a long-lasting nationwide recession. The recession has had significant economic impacts at both the statewide and local scales with widespread impacts to residential development and resource industries such as timber and fisheries. However, some development will continue to occur which, on a small-scale, can impact coho salmon habitat. Once development and associated infrastructure (roads, drainage, water development, etc.) are established, the impacts to aquatic species are expected to be permanent. Anticipated impacts to aquatic resources include loss of riparian vegetation, changes to channel morphology and dynamics, altered hydrologic regimes (increased storm runoff), increased sediment loading, and elevated water temperatures where shade-providing canopy is removed. The presence of structures and/or roads near waters may lead to the removal of LWD in order to protect those structures from flood impacts. The anticipated impacts to Pacific salmonids from continued residential development are expected to be sustained and locally intense. Commonly, there are also effects of home pesticide use and roadway runoff of automobile pollutants, introductions of invasive species to nearby streams and ponds, attraction of salmonid predators due to human occupation (e.g., raccoons), increased incidences of poaching, and loss of riparian habitat due to land clearing activities. All of these factors associated with residential development can have negative impacts on salmon populations.

A subset of this development may occur for the purposes of marijuana cultivation. Watersheds within the action area have been utilized to produce marijuana crops both legally and illegally. California law allows for the production of marijuana for medicinal purposes under Proposition 215 which establishes limits to the production of marijuana by patients or their designated growers. NMFS does not expect that cultivation of marijuana under Proposition 215 limits will result in adverse effects to coho habitat. However, illegal marijuana production within the action area can at times result in grow operations of over 100,000 plants; often these illegal grows occur on federal lands. During the proposed action permit term, NMFS expects these illegal grow operations to continue on isolated parcels within the action area. These grow operations can adversely affect coho habitat by diversion of water for irrigation, resulting in the drying of streams or draining of pools that provide rearing habitat for coho juveniles. The operations can also contaminate nearby streams by the discharge of pesticides, rodenticides, and fertilizers to nearby streams. Such influx of contaminants can be lethal to exposed coho, or result in the alteration of stream habitats via eutrophication.

#### 2.6.4 Recreation, Including Hiking, Camping, Fishing, and Hunting

Expected recreation impacts to salmonids include increased turbidity, impacts to water quality, barriers to movement, and changes to habitat structures. Streambanks, riparian vegetation, and spawning redds can be disturbed wherever human use is concentrated. Campgrounds can impair water quality by elevating nutrients in streams. Construction of summer dams to create swimming holes causes turbidity, destroys and degrades habitat, and blocks migration of juveniles between summer habitats. Impacts to salmonid habitat are expected to be localized, mild to moderate, and temporary. Fishing within the action area, typically for steelhead or Chinook salmon, is expected to continue subject to CDFW regulations. Fishing for coho salmon is prohibited in the Klamath River. The level of impact to coho salmon within the action area from angling is unknown, but is expected to remain at current levels.

## 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.

#### 2.7.1 Effects to SONCC Coho Salmon ESU Critical Habitat

As noted earlier, we do not expect the individual actions to have any appreciable effect on any listed species' critical habitat. This is true for all the Tribal Plan actions in combination as well: the actions' short duration, minimal intrusion, and overall lack of measureable effect signify that even when taken together they would have no discernible impact on critical habitat.

### 2.7.2 Effects to SONCC Coho salmon Individuals

These assessments are made in consideration of the other scientific research and monitoring that has been authorized through 4(d) and Section 10(a)(1)(A) permits and may affect the various listed species. The reasons we integrate the proposed take of the Tribal Plan considered here with the take from other research authorizations are that they are similar in nature, and we have good information on what the effects are. Thus, it is possible to determine the overall effect of all research in the region on the species considered here. The following tables, therefore, (a) combine the proposed take for the Tribal considered in this opinion (Table 7), (b) add the take proposed by the researchers in this opinion to the take that has already been authorized in the region (Table 8Table 9), and then (c) compare those totals to the estimated annual abundance of each species under consideration (Table 9).

Table 8. Total take and mortalities of SONCC coho salmon already authorized for scientific research and monitoring as of June 2019.

| Life Stage | Origin | Total Take | Percent of ESU Handled | Total Mortalities | Percent of ESU Potentially Killed |
|---|---|---|---|---|---|
| Adult | Hatchery | 1,915 | 31.3 | 9 | 0.15 |
| | Natural | 1,372 | 11.0 | 10 | 0.08 |
| Juvenile | Hatchery | 9,279 | 1.2 | 220 | 0.03 |
| | Natural | 162,633 | 13.4 | 2,234 | 0.18 |

Table 9. Total take and mortalities of SONCC coho salmon already authorized for scientific research and monitoring combined with take to be authorized by approving the Tribal Plan.

| Life Stage | Origin | Total Take | Percent of ESU Handled | Total Mortalities | Percent of ESU Potentially Killed |
|---|---|---|---|---|---|
| Adult | Hatchery | 1,981 | 32.3 | 10 | 0.16 |
| | Natural | 1,438 | 11.5 | 11 | 0.09 |
| Juvenile | Hatchery | 9,279 | 1.6 | 261 | 0.03 |
| | Natural | 182,675 | 15.0 | 2,341 | 0.19 |

When combined with scientific research and monitoring permits already approved (Section 10 (a)(1)(A) and state 4(d) permits), the total take and mortalities are low (Table 9). For SONCC coho salmon, the total amount of estimated natural-origin, lethal take for the proposed research would be 11 adults and 2,341 juveniles, representing 0.09 percent and 0.19 percent of the ESU by life stage, respectively. This is the maximum amount of lethal take contemplated in this biological opinion; if the Tribal Plan is authorized and exercised, a lesser amount of take is expected to actually occur.

And for the vast majority of scientific research permits, history has shown that researchers generally take far fewer salmonids than the allotted number of salmonids every year. For example 14.16% of requested take and 12.66% of requested mortalities were used in west coast region Section 10a1A permits from 2008 to 2015). Thus, the activities contemplated in this opinion would add only very small fractions to those already low numbers.

Thus, as Table 9 demonstrates, all the mortalities, even taken together, represent very small fractions of the various species' abundances. Our conclusion is based on these conservative assumptions. Nonetheless, and for a number of reasons, the displayed percentages are in reality almost certainly much smaller than even the small figures stated. First, the juvenile abundance estimates are deliberately designed to generate a conservative picture of abundance. Second, it is important to remember that estimates of lethal take for most of the proposed studies are purposefully inflated to account for potential accidental deaths; and it is, therefore, very likely that fewer juveniles would be killed by the research than stated. Third, for salmonids, many of the fish that may be affected would be in the smolt stage, but others definitely would not be. These latter would simply be described as "juveniles," which means they may actually be yearlings, parr, or even fry: life stages represented by multiple spawning years and many more individuals than reach the smolt stage—perhaps as much as an order of magnitude more. Therefore, the already small percentages were derived by (a) conservatively estimating the actual number of juveniles, (b) overestimating the number of fish likely to be killed, and (c) treating each dead juvenile fish as part of the same year class. Thus, the actual numbers of juvenile salmonids the research is likely to kill are undoubtedly smaller than the stated figures— probably something on the order of one seventh of the values given in the tables.

### 2.7.3 Summary

While the proposed research activities would in fact have some negative effect on each of the species' abundance, in all cases, this effect would be small, the activity has not been identified as a threat, and the benefit from the research must be taken into account. In addition, while the future impacts of cumulative effects are uncertain at this time, they are likely to continue to be negative. Nonetheless, in no case would the proposed actions exacerbate any of the negative cumulative effects discussed (habitat alterations, etc.); and in all cases, the research may eventually help to limit adverse effects by increasing our knowledge about the species' requirements, habitat use, and abundance. The effects of climate change are also likely to continue to be negative. However, given the proposed actions' short time frames and limited areas, those negative effects, while somewhat unpredictable, are too small to be effectively gauged as an additional increment of harm over the time span considered in this analysis. Moreover, the actions would in no way contribute to climate change (even locally), and in any case the proposed actions would actually help monitor the effects of climate change by noting stream temperatures, flows, marine conditions, etc. So while we can expect both cumulative effects and climate change to continue their negative trends, it is unlikely that any of the proposed actions would have any additive impact to the pathways by which those effects are realized (e.g., a slight reduction in salmonid abundance would have no effect on increasing stream temperatures or continuing land development).

To this picture, it is necessary to add the increment of effect represented by the proposed actions. Our analysis shows that the proposed research activities would have slight negative effects on each species' abundance and productivity (and probably some negative effects on diversity and structure—ones that are so small that we cannot even measure them at this point). However, those abundance and productivity reductions are so small as to have no more than a negligible effect on the species' survival and recovery. In all cases, even the worst possible effect on abundance would be small fractions of one percent, the activity has never been identified as a threat, and the research is designed to benefit the species' survival in the long term, thus offsetting any adverse effects to the viability of SONCC coho salmon.

For more than a decade, research and monitoring activities conducted on anadromous salmonids along the west coast have provided resource managers with a wealth of important and useful information regarding anadromous fish populations. For example, juvenile fish trapping efforts have enabled the production of population inventories, PIT-tagging efforts have increased the knowledge of anadromous fish migration timing and survival, and fish passage studies have provided an enhanced understanding of how fish behave and survive when moving past dams and through reservoirs. By issuing research authorizations—including these being contemplated in this opinion—NMFS has allowed information to be acquired that has enhanced resource managers' abilities to make more effective and responsible decisions to sustain anadromous salmonid populations, mitigate adverse impacts on endangered and threatened salmon and steelhead, and implement recovery efforts. The resulting information continues to improve our knowledge of the respective species' life histories, specific biological requirements, genetic make-up, migration timing, responses to human activities (positive and negative), and survival in the rivers and ocean.

And that information, as a whole, is critical to the species' survival. Therefore, we expect the detrimental effects on the species are expected to be minimal and those impacts would only be seen in terms of slight reductions in abundance and productivity. And because these reductions are so slight, the actions—even in combination—would have no appreciable effect on the species' diversity or distribution. Moreover, the actions are expected to provide lasting benefits for the listed fish (albeit unquantifiable at this time), and all habitat effects would be negligible.

## 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 or destroy or adversely modify its designated critical habitat.

## 2.9 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. “Harm” is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). “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.

In this instance, and for the actions considered in this opinion, there is no incidental take at all. The reason for this is that all the take contemplated in this document would be carried out under the Tribal Plan which allows the researchers to directly take the animals in question. The actions are considered to be direct take rather than incidental take because in every case their actual purpose is to take the animals while carrying out a lawfully permitted activity. Thus, the take cannot be considered "incidental" under the definition given above. Nonetheless, one of the purposes of an incidental take statement is to lay out the amount or extent of take beyond which individuals carrying out an action cannot go without being in possible violation of section 9 of the ESA. That purpose is fulfilled here by the amounts of direct take laid out in the effects section above (2.5) and summarized in the integration and synthesis section (2.7; Table 7). Those amounts—displayed in the Tribal Plan’s effects analysis—constitute hard limits on both the amount and extent of take the researchers would be allowed in a given year. This concept is also reflected in the reinitiation clause just below.

## 2.10 Reinitiation of Consultation

This concludes formal consultation for “Evaluation and Recommended Determination of a Tribal Research and Monitoring Plan Submitted for Consideration Under the Endangered Species Act’s Tribal Plan Limit [50 CFR 223.204] for the period Month XX, 2019 – December 31, 2023.”

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.

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

# 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 NMFS and descriptions of EFH for Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the Pacific Fishery Management Council (PFMC) and approved by the Secretary of Commerce.

## 3.1 Essential Fish Habitat Affected by the Project

In the estuarine and marine areas, salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 km) offshore of Washington, Oregon, and California north of Point Conception. The EFH identified within the action areas are identified in the Pacific coast salmon fishery management plan (PFMC 2014). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years).

## 3.2 Adverse Effects on Essential Fish Habitat

As the Biological Opinion above describes, the proposed research actions are not likely, singly or in combination, to adversely affect the habitat upon which Pacific salmon, groundfish, and coastal pelagic species, depend. All the actions are of limited duration, minimally intrusive, and are entirely discountable in terms of their effects, short-or long-term, on any habitat parameter important to the fish.

## 3.3 Essential Fish Habitat Conservation Recommendations

No adverse effects upon EFH are expected; therefore, no EFH conservation recommendations are necessary.

## 3.4 Supplemental Consultation

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

# 4 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

## 4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are [*name of Federal action agency(ies)*]. Other interested users could include [*e.g., permit or license applicants, citizens of affected areas, others interested in the conservation of the affected ESUs/DPS*]. Individual copies of this opinion were provided to the [*name of action agency(ies)*]. 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, if applicable*] contain more background on information sources and quality.

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

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

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