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

Issuance of a Tribal 4(d) Rule Determination for a Tribal Resource Management Plan as submitted by the Hoopa Valley Tribe

NMFS Consultation Number: *WCRO-2020-03718*

Action Agency: National Marine Fisheries Service (NMFS)

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?
Southern Oregon / Northern California Coast Coho Salmon (*Oncorhynchus kisutch*)	Threatened	Yes	No	No	No

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

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

Issued By:

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Date: July 13, 2022

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1. INTRODUCTION

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

1.1 Background

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

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

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

1.2 Consultation History

The 4(d) Rule for Salmon and Steelhead

In 2005, NMFS issued a final rule pursuant to ESA section 4(d) (4(d) Rule), adopting regulations necessary and advisable to conserve threatened species (50 CFR 223.203). The 4(d) Rule established take prohibitions for threatened Evolutionarily Significant Units (ESU) and Distinct Population Segments (DPS) of Pacific salmon and steelhead. The 4(d) Rule also provides limits on the application of these take prohibitions, including specific situations when take prohibitions do not apply.

NMFS issued a final rule for Tribal Plans known as the Tribal 4(d) Rule (50 CFR 223.204), which harmonizes statutory conservation requirements with tribal rights and the Federal trust responsibility to tribes. The Tribal 4(d) Rule declared that take prohibitions do not apply to activities carried out under a Tribal Resource Management Plan (TRMP) as long as NMFS has determined that the plan will not appreciably reduce the likelihood of survival and recovery of listed species. In making a determination under the Tribal 4(d) rule, the Secretary of Commerce shall use the best available biological data (including any tribal data and analysis) to determine the impact of the TRMP on the biological requirements of the species, and will assess the effects on survival and recovery, consistent with legally enforceable tribal rights and with the Secretary's trust responsibilities to tribes (50 CFR 223.204). The purpose of the Tribal 4(d) rule is to establish a process whereby the conservation needs of listed species are met while respecting tribal rights, values, and needs and not abridging any treaties, rights, executive orders, or statutes (65 FR 42481; July 10, 2000). The rule recognizes the trust responsibilities to the tribes and reinforces the commitment to government-to-government relations expressed in, among other things, Secretarial Order 3206.

Hoopa Valley Tribe's Tribal Resource Management Plan

On May 18, 2021, NMFS received a TRMP and a letter from the Hoopa Valley Tribe (HVT) requesting formal consultation on the HVT TRMP under the ESA (Hoopa Valley Tribe 2021). The objective of the TRMP is to provide the HVT harvest opportunity for Chinook salmon, coho salmon and steelhead in the Trinity River in a manner that does not jeopardize the existence of the Southern Oregon/Northern California Coast (SONCC) Coho Salmon Evolutionarily Significant Unit (ESU). SONCC coho salmon are listed as threatened under the ESA. NMFS reviewed the TRMP and responded with a letter on May 26, 2021 indicating that the TRMP contained sufficient information for NMFS to begin its analysis.

As per the Tribal 4(d) Rule, NMFS consulted with the Tribe and its representative staff during the development of the TRMP. This communication provided an opportunity for NMFS to provide technical assistance, exchange information, discuss conservation needs of the listed species, and discuss the importance of the action in relation to legally enforceable tribal rights and Federal trust responsibilities.

Consistent with requirements of the Tribal 4(d) Rule, NMFS assessed the TRMP and prepared a Proposed Evaluation and Pending Determination (PEPD) as to whether implementation of the TRMP will appreciably reduce the likelihood of survival and recovery of ESA-listed salmon and steelhead. The PEPD was posted on the NMFS website and a notice of availability was posted in the Federal Register on February 23, 2022 (87 FR 10174). The public comment period expired on March 25, 2022. No comments were received on the PEPD and NMFS prepared an Evaluation and Recommended Determination.

For purposes of this consultation, we considered whether the substantive analysis and its conclusions regarding the effects of the proposed actions articulated in the biological opinion and its incidental take statement would be any different under the 50 CFR part 402 regulations as they existed prior to the 2019 Rule vacated by the order of the United States District Court for the Northern District of California on July 5, 2022. We have determined that our analysis and conclusions would not be any different.

1.3 Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (see 50 CFR 402.02). The Proposed Action is a determination by NMFS that the HVT TRMP meets the requirement of the ESA Tribal 4(d) Rule. The approach to the determination is described in the NMFS Evaluation and Recommended Determination (ERD)(NMFS 2022c). The determination will result in the implementation of the TRMP by the HVT.

"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). We considered, under the ESA, whether or not the Proposed Action would cause any other such activities and determined that the Proposed Action would only result in the fisheries and associated monitoring activities as described in the HVT TRMP.

In the sections below, we describe the proposed HVT fisheries, limits for harvest, and monitoring and evaluation associated with the fisheries.

1.3.1 HVT TRMP Overview

The HVT TRMP describes the tribal fisheries targeting Chinook salmon, coho salmon, and steelhead in the Trinity River within the boundaries of the Hoopa Valley Reservation (HVR) Figure 8 (Hoopa Valley Tribe 2021). HVT fisheries evaluated under the Proposed Action include 1) an Individual Tribal Member Fishery (ITMF), which consists of gill nets and hook and line fishing and 2) a selective harvest weir, which would retain hatchery origin (HOR) coho salmon and release natural origin (NOR) coho salmon unharmed (Hoopa Valley Tribe 2021). The TRMP includes a system of monitoring, evaluation, and reporting to ensure that the fisheries are implemented without jeopardizing NOR SONCC coho salmon. The fisheries and associated monitoring activities are described in detail in the HVT TRMP (Hoopa Valley Tribe 2021) and are summarized in this opinion.

1.3.2 TRMP Objectives:

The primary objective of the TRMP is to provide tribal harvest opportunities for Chinook salmon, coho salmon, and steelhead in the Trinity River in a manner that does not appreciably reduce the likelihood of survival and recovery of SONCC coho salmon. The TRMP includes a set of performance standards related to the primary objective and indicators that would be used to assess whether each standard is being achieved. Performance standards and indicators are shown in Table 1.

Table 1. Performance standards, and performance indicators from the HVT TRMP.

Objective or Performance Standard	Performance Indicators
1. Monitor and evaluate fisheries/weir and limit impacts on ESA protected coho salmon	1. Number of fish harvested and released
	2. Catch Per Unit Effort in the Individual Tribal Member Fishery (ITMF)
	3. Limits for impacts on natural origin return (NOR) coho salmon are established and maintained at weir
	4. Limits for impacts on NOR coho salmon are established and maintained for ITMF
	5. Effects of the weir on NOR coho salmon are minimized.
2. Monitor and evaluate adverse effects on NOR coho salmon	1. Estimates of injury and mortality of NOR coho salmon
	2. Changes in migration timing of coho salmon run
	3. Estimates of pre-spawn mortality for NOR coho salmon
	4. Weir is monitored and attended continuously
	5. Multiyear trends in NOR abundance
	6. Number of NOR coho salmon released
	7. Number of NOR coho salmon passing the weir
	8. Number of NOR coho salmon at Willow Creek and Junction City weirs (operated by California Department of Fish and Wildlife (CDFW))
	9. Number of NOR coho salmon on spawning grounds
	10. Number of NOR coho salmon returning to Trinity River Hatchery (TRH) (operated by CDFW)
3. Reduce escapement of hatchery coho salmon to natural spawning areas	1. Number of hatchery origin return (HOR) coho salmon passing the weir
	2. Percent hatchery origin spawners in natural production areas
	3. Harvest rate on HOR coho salmon at weir and in the ITMF
	4. Number of coho salmon taken for broodstock at TRH and offsite broodstock collection weir
4. Adhere to terms of the TRMP and provide regular reports to NMFS	1. Monitoring and evaluation framework are documented and employed
	2. HVT Fisheries are monitored and regulations enforced
	3. Progress (in-season) reporting
	4. Third party concerns are communicated between NMFS and HVT
	5. Annual reporting
5. Provide harvest opportunities for HVT while minimizing impacts on NOR coho salmon	1. HVT is able to prosecute meaningful fisheries
	2. Fishing effort and weir operation days
	3. Production of HOR at TRH is balanced to provide for meaningful fishery and sufficient brood-stock
	4. Species diversity and abundance
	5. Ratio of bycatch to target catch
	6. Total HVT fishery impacts and exploitation rate for NOR coho salmon (expressed as fractions of Trinity River run and of SONCC ESU)

1.3.3 HVT Fisheries

Individual members of the HVT have harvested and consumed salmon and steelhead since time immemorial. The HVT has a federally reserved fishing right to harvest anadromous fish (Office of the Solicitor 1993). Historically, HVT fisheries targeted NOR Chinook salmon, coho salmon, and steelhead. However, HOR fish comprise the majority of present-day harvest (e.g., an average of 40 percent of the Chinook salmon and 90 percent of the coho salmon harvested are HOR fish) (Hoopa Valley Tribe 2021). Coho salmon (NOR and HOR) in the project area are in the SONCC Coho Salmon ESU and are listed as threatened under the ESA. Steelhead and Chinook salmon in the project area are not listed under the ESA.

HVT fisheries are conducted in accordance with the HVT Fishing Ordinance (Hoopa Valley Tribe 1986). Fishing by tribal members occurs within the boundaries of the HVR in the Trinity River from one mile upstream of the confluence with the Klamath River upstream to the boundary of the HVR, approximately 12 river miles (Figure 8; see description of the Action Area). The Hoopa Valley Tribal Council (HVTC) oversees the conduct of the Tribe's fishery, determines annual tribal fishing regulations, enforces the fishing ordinance, and ensures collection of harvest statistics and other fishery monitoring information through the HVT Fisheries Department (PFMC and NMFS 2020; Hoopa Valley Tribe 2021). The HVTC determines the level of fishing opportunity that will be provided annually to tribal members based on preseason estimates of Chinook salmon abundance, and implements the fisheries through regulation. Estimates of preseason abundance are not currently available for coho salmon and steelhead.

Under the Proposed Action, the ITMF would continue to operate as it has during recent history (see Figure 1). The primary gear types used in the ITMF are gill nets and hook-and-line. Target species are Chinook salmon, coho salmon, and steelhead (see Table 2). ITMF fisheries target Chinook salmon in the spring (May-July), and the fall (August-November). Fishing effort increases in the fall as net fishers target fall run Chinook salmon. Hook-and-line fishing effort is mostly during August and September. Coho salmon are encountered during fisheries targeting fall Chinook and are targeted during their peak migration in October.

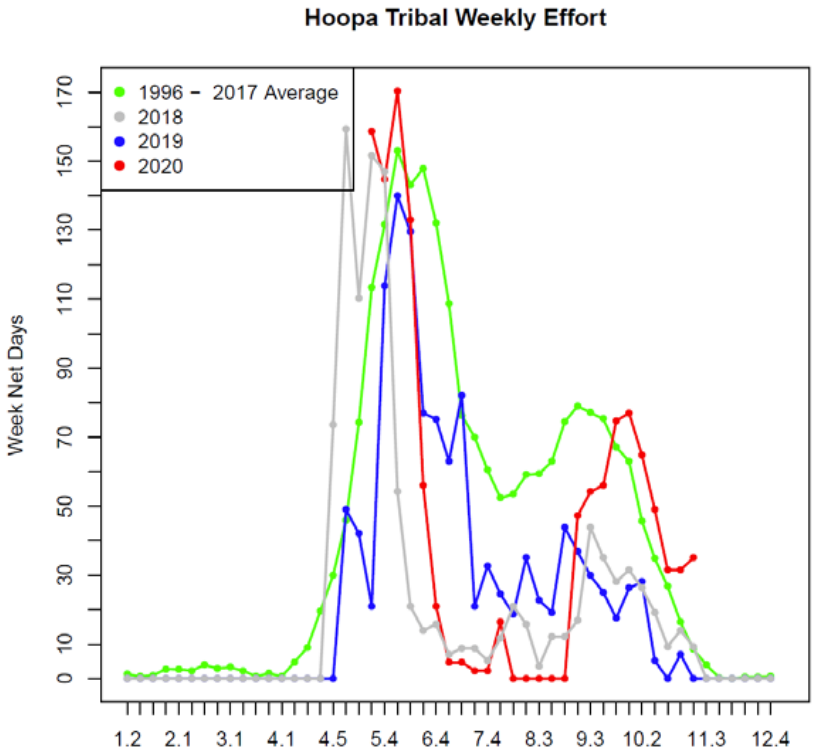

Figure 1. Effort (net days) by week in the ITMF gill net fishery during 2018- 2020 and average effort during 1996-2017. Weeks (x-axis) are represented as month.week (example: first week in January would be 1.1).

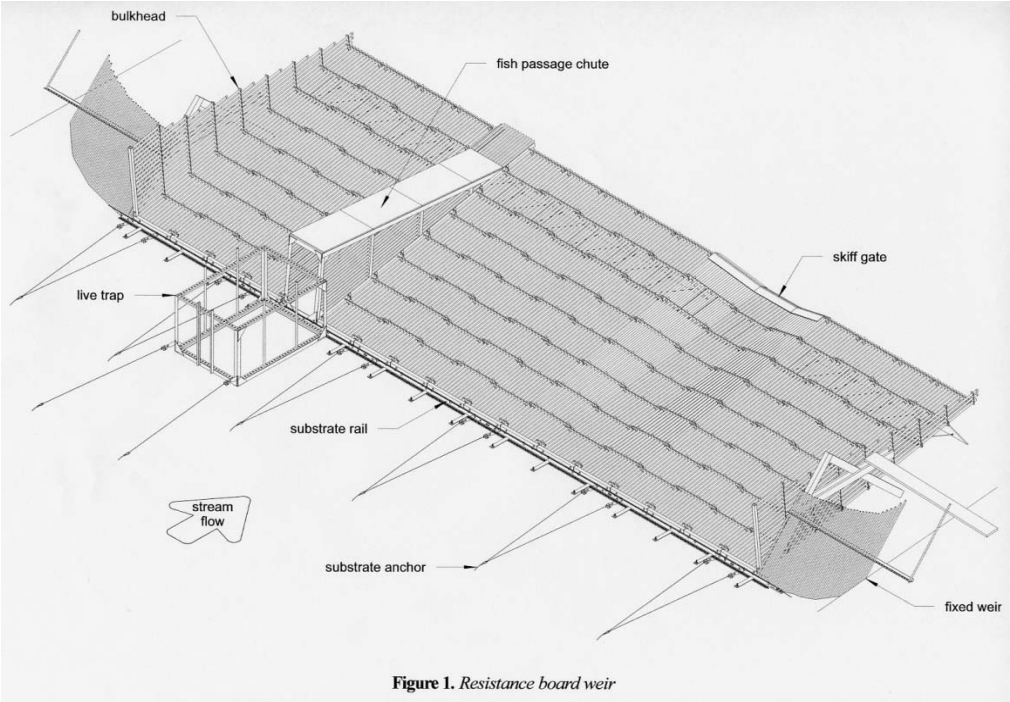

Figure 2. Schematic of a resistance board weir from Stewart (2003).

Table 2. Fisheries, gears, target species, and released fish under the Proposed Action.

Fishery	Gear	Target Species	Fish Released
Individual Tribal Member Fishery (ITMF)	Gillnets Hook and line	Chinook salmon Coho salmon Steelhead	None
Selective harvest weir	Floating resistance board weir	Chinook salmon Coho salmon (hatchery origin) Steelhead (hatchery origin)	Coho salmon (natural origin) Steelhead (natural origin)

The HVT weir fishery was developed to selectively harvest HOR coho salmon and decrease the proportion of hatchery origin spawners (pHOS) for coho salmon in the Trinity River. Decreasing pHOS aligns with the Hatchery Genetic Management Plan (HGMP) for Trinity River Hatchery (TRH) and the Final Recovery Plan for the SONCC Coho Salmon ESU (NMFS 2014b; NMFS et al. 2017). The weir is a floating resistance board type (see Figure 2) and is installed in the river near the southern boundary of the HVR (Figure 8). Weir operations have started as early as September 1, and concluded as late as November 1 with annual trapping days ranging from 8 to 39 days (Years 2016 to 2019). The Proposed Action includes operation of the selective harvest weir during the entire coho salmon migration from September through November. The target species are Chinook salmon and HOR coho salmon; HOR steelhead may also be retained (Table 2). All NOR coho salmon and NOR steelhead will be released upstream of the weir. Care will be given to fish that are released to minimize stress, injury, and delay. The operation plan includes provisions for regular periods of uninhibited passage through the weir to allow fish to migrate past the weir without being trapped (i.e., the weir is "open"). The weir will be open for a minimum of 88 hours (52 percent of the time) each week. When the weir is operated, the panels are closed to prohibit upstream passage and fish swim volitionally into the live trap. The weir will be operated Monday through Friday from early evening to the following morning (i.e., between the hours of 1700–0900).

1.3.4 Monitoring and evaluation of HVT fisheries

The TRMP provides for routine monitoring of the ITMF and the weir. Monitoring of the ITMF includes a roving creel survey[1] to establish species composition, origin (i.e., hatchery and natural), and amount of fish harvested and released. HVT fisheries staff will be present 24 hours per day at the weir to discourage vandalism and/or poaching, and to monitor fish behavior below the weir, water flow and temperature, fish densities in the traps, debris loading on the weir, and any predator interactions with fish near the weir. HVT Fisheries staff will empty the weir traps each day and carefully release non-target fish above the weir. If water temperatures exceed 70º F, trapping operations will be suspended and the weir will be left open. If river flow is expected to exceed the safe operating range (2,001 cfs) for the weir and traps, the weir will be left open and traps may be removed.

The TRMP considers ancillary effects of the weir on fish migration, includes plans for monitoring these effects, and describes contingencies intended to mitigate for these effects. The physical presence of a weir or trap can affect salmonid behavior by delaying upstream migration (delay) or

[1] A creel survey is a type of in-person survey where an interviewer asks a participant in the fishery questions to collect data on the fishery. Questions include the duration of the fishing effort, how many fish were caught and released.

by causing them to avoid the weir structure (rejection). To monitor for delay and rejection, daily monitoring of the ITMF below the weir (downstream to Tish Tang Creek) will be conducted. Increases in catch rates in the ITMF may be indicative of increased concentration of fish below the weir. If increased concentrations are suspected, a diver survey will be employed to observe fish densities below the weir. When the weir is closed (i.e., fishing), capture of fish in the weir traps will confirm that fish are successfully passing the weir. The traps will be emptied every day when the weir is closed to minimize any delays to coho salmon migration from being held in the traps. In the case that NOR coho salmon are accumulating below the weir and rejection or delay is suspected, weir panels will be removed to increase potential navigation pathways through the weir structure.

1.3.5 Expected Harvest Rates

The HVT TRMP describes and quantifies the capture of NOR coho salmon in the ITMF and weir fishery. The effects on NOR coho salmon are different in the ITMF and the weir because captured NOR coho are retained in the ITMF and released in the weir fishery. When fish are released, a small proportion will eventually die due to the effects of being captured and handled. This level of mortality can be estimated by using a proportional rate (percent of fish released) of mortality due to capture and handling.

The TRMP provides a common metric, harvest rate (HR), to represent the mortality of NOR coho salmon from 1) capture and retention in the ITMF and 2) capture and release in the weir fishery. This allows the total fishery related mortality for both fisheries to be accounted for.

ITMF HR Calculation and Statistics

The number of NOR coho salmon retained in the ITMF is converted to an HR where:

$$ITMF\ HR = \frac{(\text{NOR coho salmon retained})}{(\text{NOR coho salmon abundance})}$$

Where:

$$\text{NOR coho salmon abundance} = \text{NOR coho salmon returning to the Trinity River mouth}$$

ITMF HR for NOR coho salmon during 2001-2019[2] are provided in the TRMP. Descriptive statistics for the ITMF HR are as follows:

HR range: 0 percent to 8.0 percent

HR average: 3.0 percent

Average of three highest HRs: 7.0 percent

Maximum three-year rolling average HR: 5.0 percent

[2] 2018 was omitted because estimates of abundance are not considered reliable due to very small sample size (Hoopa Valley Tribe 2021; PFMC 2021).

The ITMF HR of NOR coho salmon under the Proposed Action is expected to be similar to the harvest during 2001-2019 with any consecutive three-year rolling average not exceeding 5.0 percent.

HVT Weir Calculation and Statistics
The mortalities of NOR coho resulting from the weir fishery is represented as an HR where:

$$Weir\ HR = \frac{(\text{NOR coho salmon released}) \times (\text{Incidental mortality rate})}{\text{NOR coho salmon abundance}}$$

Where:

$$Incidental\ mortality\ rate = 3\ percent$$

The incidental mortality rate for the weir is based on studies of similar weir operations and NMFS reviews (NMFS 2011; 2014a; 2017a; 2017b). Weir HRs for NOR coho salmon are provided in the TRMP. During 2016-2019, the HR averaged 0.45 percent. The weir HR of NOR coho salmon under the Proposed Action is expected to be similar with a consecutive three-year rolling average not exceeding 0.45 percent.

Combined, the HR of the ITMF and weir fisheries are expected to align with the averages reviewed here. Thus, the Proposed Action would result in a total HR not to exceed a three-year rolling average of 5.45 percent on NOR coho salmon. In Section 2.5, the effect of this harvest is described in the overall context of regional fisheries and the SONCC Coho Salmon ESU.

1.3.6 Reporting

Under the provisions of the TRMP, the HVT will provide in-season and post-season annual reports to NMFS. The in-season reports will document the installation, operation, and removal of the weir and provide a mid-season (mid-October) update on coho salmon captured at the weir. The post-season annual report will describe the operations of the ITMF and weir, evaluate the implementation of the TRMP against the objectives and performance standards, and provide summary data including biological data (fork length, record of external marks or tags, apparent signs of disease, weir scars or preexisting wounds), numbers of fish handled by species, and HRs of coho salmon. The post-season annual report will be sent to NMFS by February 15th of the year following weir operations and conclusion of the ITMF. In addition to data provided under provisions of the TRMP, catch data for Chinook salmon harvested in the HVT fisheries are provided annually to the Pacific Fishery Management Council (PFMC) (PFMC and NMFS 2020).

1.3.7 Annual Review and Re-Evaluation of the TRMP

Under the provisions of the TRMP, the HVT will conduct an annual review of the implementation of the TRMP. The evaluation will compare the TRMP objectives, performance standards and HRs with the actual results of the HVT fisheries and associated monitoring. These results would be described in the post-season annual report to NMFS. After the first three years of implementation, NMFS and HVT will reevaluate the performance of the TRMP. The reevaluation will consider the performance of the TRMP using the performance standards and indicators and will compare the observed HRs to the expectations and effects described in this opinion and the NMFS ERD (NMFS 2022c).

The TRMP also identifies triggers that would lead to reevaluation of the TRMP by NMFS and HVT. These reevaluation triggers are:

- HR on SONCC coho salmon exceeds expectations described in the TRMP;
- The actions described by the TRMP are implemented in such a manner that causes an effect on ESA-listed species that was not previously considered in the NMFS evaluation;
- New information or monitoring reveals effects that may affect listed species in a way not previously considered; or
- A new species is listed or critical habitat is designated that may affect NMFS' evaluation of the TRMP.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

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

2.1 Analytical Approach

This biological opinion includes a jeopardy analysis. An adverse modification analysis is not included in this biological opinion because critical habitat is not present in the action area (64 FR 24049; May 5, 1999; see section 2.3 for a description of the action area). The jeopardy analysis relies upon the regulatory definition of "jeopardize the continued existence of" a listed species, which is "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion 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 of critical habitat for SONCC Coho Salmon uses the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological

opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

We use the following approach to determine whether the Proposed Action is likely to jeopardize the continued existence of SONCC coho salmon:

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

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of the SONCC Coho Salmon ESU, which is likely to be adversely affected by the Proposed Action. The status is determined by the level of extinction risk that the listed species faces, based on parameters considered in documents including recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' "reproduction, numbers, or distribution" for the jeopardy analysis. 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 function of the PBFs that are essential for the conservation of the species.

2.2.1 SONCC Coho Salmon ESU

The SONCC Coho Salmon ESU was listed as threatened under the ESA on May 6, 1997 (62 FR 24588). The listing was most recently reaffirmed on June 28, 2005 (70 FR 37159). Critical habitat for the SONCC ESU was designated on May 5, 1999 (64 FR 24049). Tribal lands were specifically excluded from the critical habitat designation. In 2005, the Final 4(d) protective regulations were published (70 FR 37159; June 28, 2005). A recovery plan was finalized in 2014 and NMFS evaluated the status of the ESU in 2016, concluding that there was no change in extinction risk (NMFS 2014b; 2016; Williams et al. 2016). A new status review is currently underway but will not be complete before finalization of this document. However, the information contained in this opinion has been updated to contain the best scientific information available on the status of SONCC coho salmon.

The SONCC Coho Salmon ESU includes all naturally spawned populations of coho salmon in coastal streams between Cape Blanco, Oregon and Punta Gorda, California, as well as coho salmon

produced by three artificial propagation programs: Cole Rivers Hatchery (Rogue River), Trinity River Hatchery, and Iron Gate Hatchery (Klamath River). The ESU includes coastal watersheds from the Elk River (Oregon) in the north to the Mattole River (California) in the south (Figure 3). The ESU is distributed across three large basins and numerous smaller basins across a diverse landscape. The ESU is divided into seven diversity strata comprising 40 populations (Figure 4 and Table 4) (NMFS 2014b).

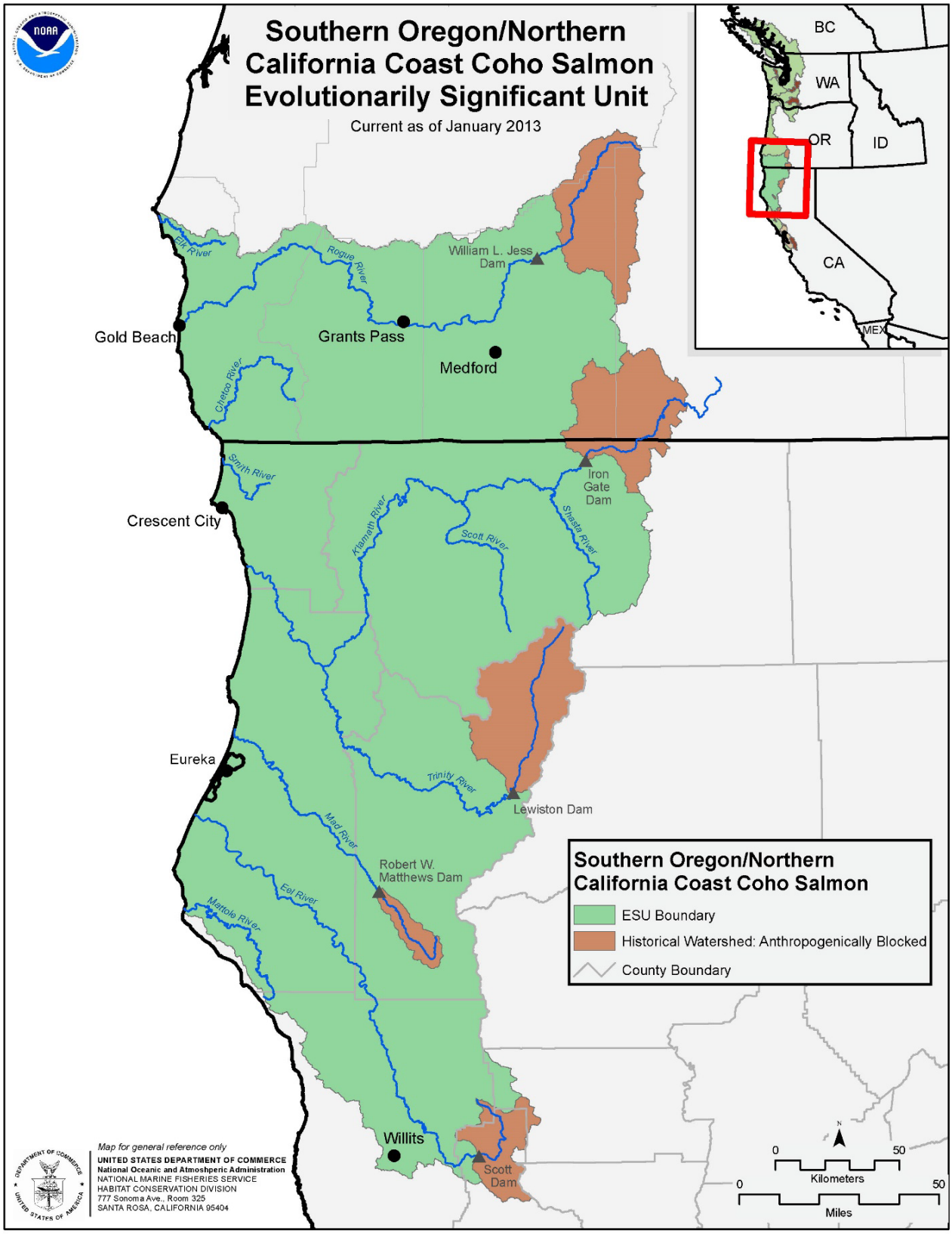

Figure 3. Map depicting the boundary of the SONCC ESU. Trinity River and Lewiston Dam are shown on the map (NMFS 2014b).

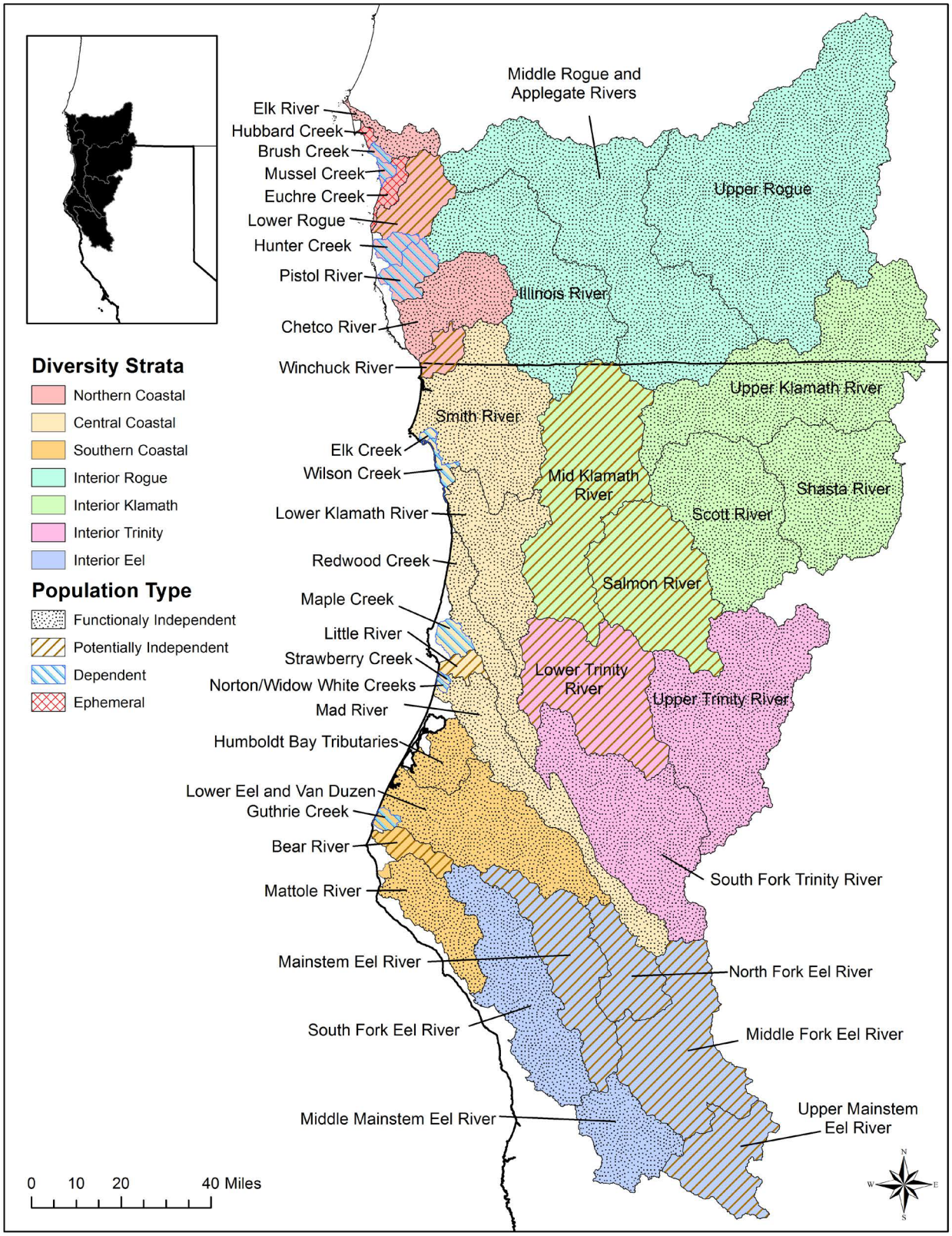

Figure 4. Population type and diversity strata of the SONCC Coho Salmon ESU (NMFS 2014b).

2.2.2 Viability

Viability is the likelihood that a population will sustain itself over a 100-year time frame (McElhany et al. 2000). We assess the status of the SONCC Coho Salmon ESU using criteria based on the Viable Salmonid Population (VSP) concept developed by McElhany et al. (2000). Viability criteria are the means by which a viable ESU is defined and extinction risk is evaluated. The VSP concept uses parameters of abundance, productivity, spatial structure, and diversity to assess species viability, evaluate extinction risks, and develop delisting criteria. VSP parameters for SONCC coho salmon are designated in NMFS viability assessments, 5-Year Status Reviews, and the Recovery Plan for SONCC Coho Salmon (Williams et al. 2008; NMFS 2014b; 2016; Williams et al. 2016).

The NMFS viability assessments and recovery plan for SONCC coho salmon identified biological recovery objectives and designated populations that are most important for recovery (Williams et al. 2008; NMFS 2014b; Williams et al. 2016). Populations of SONCC coho salmon are categorized as core and non-core populations depending on their role in rebuilding the ESU to recovery. Core populations must be at low risk of extinction to achieve recovery. Other populations will contribute to maintaining and increasing connectivity and diversity. Non-Core 1 populations must be at moderate risk of extinction to achieve recovery. Non-Core 2 populations and dependent populations have no target extinction risk.(NMFS 2014b). Table 4 lists the role of each SONCC coho salmon population in rebuilding the ESU.

Table 3. Demographic recovery criteria for SONCC coho salmon populations (NMFS 2014b).

VSP Parameter	Population Role	Biological Recovery Objective	Biological Recovery Criteria
Abundance	Core	Achieve a low risk of extinction	The geometric mean of wild adults over 12-years meets or exceeds the "low risk threshold" of spawners for each core population
	Non-Core	Achieve a moderate or low risk of extinction	The annual number of wild adults is greater than or equal to four spawners per IP-km for each non-core population
Productivity	Core and Non-Core	Population growth rate is not negative	Slope of regression of the geometric mean of wild adults over the time series ≥ zero
Spatial Structure	Core and Non-Core	Ensure populations are widely distributed	Annual within-population juvenile distribution ≥ 80% of habitat
	Non-Core and Dependent	Achieve inter- and intra-stratum connectivity	≥ 80% of accessible habitat is occupied in years following spawning of cohorts that experienced high marine survival
Diversity	Core and Non-Core	Achieve low or moderate hatchery impacts on wild fish	Percent hatchery-origin spawners (pHOS)
	Core and Non-Core	Achieve life-history diversity	Variation is present in migration timing, age structure, size, and behavior. The variation in these parameters is retained.

Williams et al. (2006) developed a classification system in which SONCC coho salmon populations were classified based on their ability to persist in isolation. The four population classifications are: Functionally Independent, Potentially Independent, Dependent, and Ephemeral. Populations that are viable in isolation are functionally or potentially independent and populations that are not viable-in-isolation are either dependent or ephemeral (NMFS 2014b). Figure 4 shows the population types for SONCC coho salmon.

Table 4. Extinction risk, role in ESU recovery, recovery criteria (low-risk threshold), and depensation threshold (high-risk threshold) for the populations of the SONCC Coho Salmon ESU (NMFS 2014b). Core populations are bolded.

Stratum	Populations	Risk Status	Recovery Role	Recovery Criteria	Depensation Threshold
Northern Coastal Basin	**Elk River**	High	**Core**	2,400	63
	Brush Creek	High	Dependent	--	--
	Mussel Creek	High	Dependent	--	--
	Lower Rogue River	High	Non-core 1	320	81
	Hunter Creek	High	Dependent	--	--
	Pistol Creek	High	Dependent	--	--
	Chetco River	High	**Core**	4,500	135
	Winchuck River	High	Non-core 1	230	57
Central Coastal Basin	**Smith River**	High	**Core**	6,800	325
	Elk Creek	High	Dependent	--	--
	Wilson Creek	High	Dependent	--	--
	Lower Klamath River	High	**Core**	5,900	205
	Redwood Creek	High	**Core**	4,900	151
	Maple Creek/Big Lagoon	--	Dependent	--	--
	Little River	Moderate	Non-core 1	140	34
	Strawberry Creek	--	Dependent	--	--
	Norton/Widow White Creek	--	Dependent	--	--
	Mad River	High	Non-core 1	550	136
Southern Coastal Basin	**Humboldt Bay tributaries**	Moderate	**Core**	5,700	191
	Lower Eel/Van Duzen River	High	**Core**	7,900	394
	Guthrie Creek	--	Dependent	--	--
	Bear River	High	Non-core 2	--	--
	Mattole River	High	Non-core 1	1,000	250
Interior Rogue R	**Illinois River**	High	**Core**	11,800	590
	Middle Rogue/Applegate River	High	Non-core 1	2,400	603
	Upper Rogue River	Moderate	**Core**	13,800	689
Interior Klamath	Middle Klamath River	Moderate	Non-core 1	450	113
	Upper Klamath River	High	**Core**	8,500	425
	Shasta River	High	**Core**	4,700	144
	Scott River	Moderate	**Core**	6,500	250
	Salmon River	High	Non-core 1	450	114
Interior Trinity	**Lower Trinity River**	High	**Core**	3,600	112
	South Fork Trinity River	High	Non-core 1	970	242
	Upper Trinity River	Moderate	**Core**	5,800	365
Interior Eel	**Mainstem Eel River**	High	**Core**	2,600	68
	Middle Mainstem Eel River	High	**Core**	6,300	232
	Upper Mainstem Eel River	High	Non-core 2	--	--
	Middle Fork Eel River	High	Non-core 2	--	--
	South Fork Eel River	Moderate	**Core**	9,300	464
	North Fork Eel River	High	Non-core 2	--	--

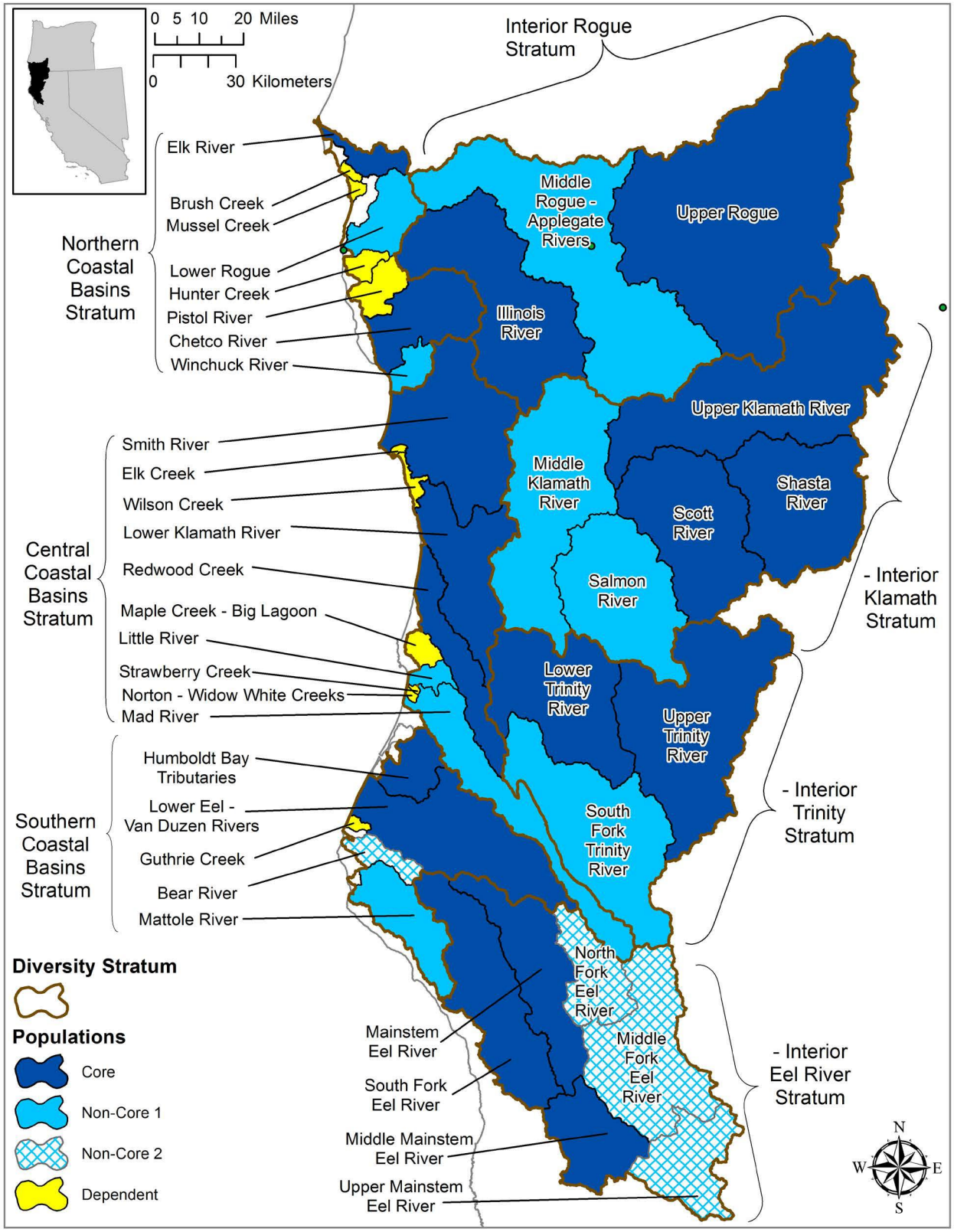

Figure 5. The role of each population in the recovery of SONCC Coho Salmon ESU (NMFS 2014b).

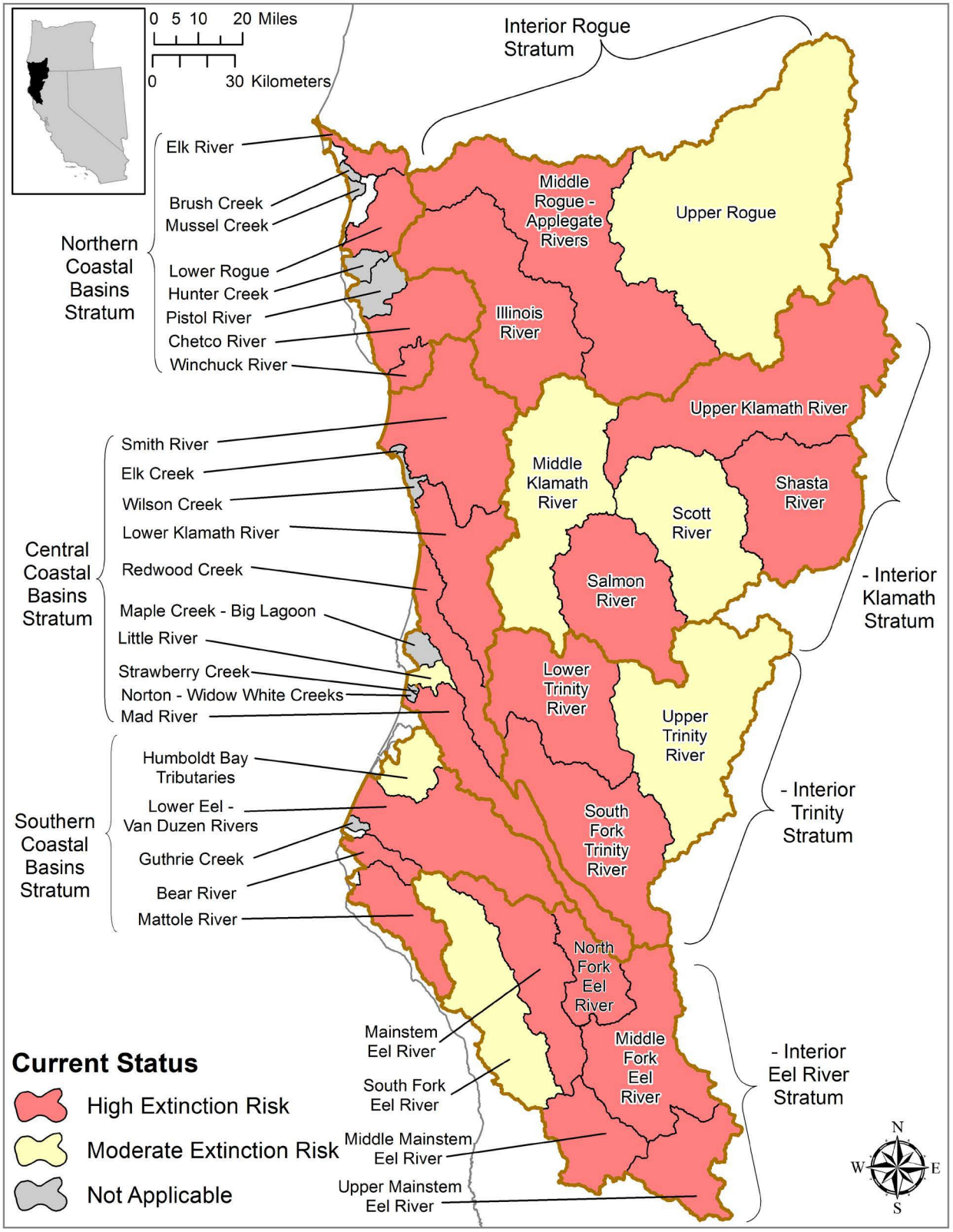

Figure 6. Current extinction risk of independent populations in the SONCC Coho Salmon ESU (NMFS 2014b).

Extinction Risk

The extinction risk of an ESU depends upon the extinction risk of its constituent populations and viability criteria used to assess extinction risk. The NMFS recovery plan describes the extinction risk of each independent population of SONCC coho salmon (NMFS 2014b). Extinction risks range from moderate to high among the populations of SONCC coho salmon, with over three-quarters of the independent populations at high risk of extinction. Many of the populations are at high risk of extinction because of low spawner densities. Populations with extremely low numbers of spawning adults can suffer from depensatory effects, which are problems with successful reproduction (e.g., spawners being too scarce to find each other) that can increase demographic and genetic risk to the population. The number of spawners needed to avoid depensatory effects is called the depensation (or high-risk) threshold. To meet biological recovery criteria, a minimum number of spawners are needed to fully seed the freshwater habitat; this is referred to as the low-risk spawner threshold. Extinction risk and spawner thresholds for each population of SONCC coho salmon are shown in Table 4 and Figure 6.

Abundance and Productivity

Long-term trends of abundance are not available for many of the populations of SONCC coho salmon. Available data are shown in Figure 7 and indicate that spawner abundance has generally declined for populations in this ESU. Most of the 30 independent populations in the ESU are at high risk of extinction for abundance because they are below, or likely below, their depensation threshold. None of the seven diversity strata appear to currently support a single viable population (PFMC 2021). Productivity information for SONCC coho salmon is not readily available. However, in general, declining productivity equates to declining abundance (NMFS 2014b).

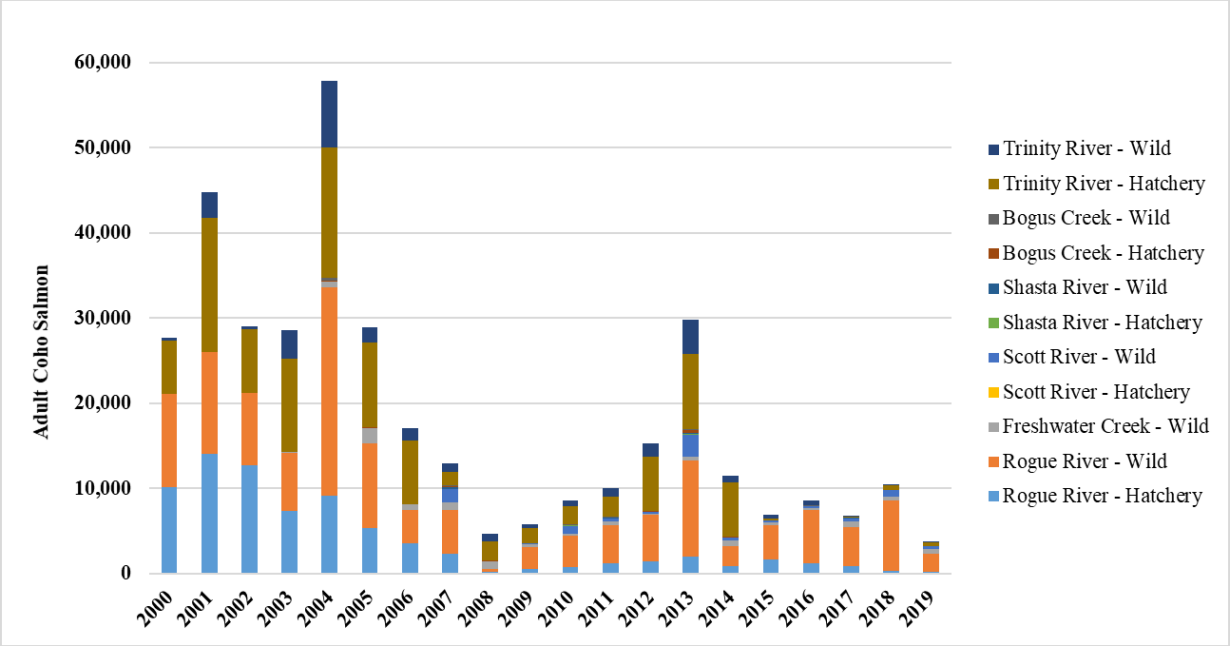

Figure 7. Escapement of adult SONCC coho salmon for return years 2000 through 2019 (PFMC 2021). Escapement estimates are to natural spawning areas except for the Rogue River population which includes escapement to the hatchery.

Spatial Structure and Diversity

Williams et al. (2008) explicitly discussed spatial structure of SONCC coho salmon and concluded data were insufficient to set specific spatial structure targets for the populations. Available data are inadequate to determine whether the spatial structure of SONCC coho salmon has changed since 2005 (NMFS 2014b). The distribution of SONCC coho salmon is reduced and fragmented. This is demonstrated by an increasing number of previously occupied streams that no longer appear to have coho salmon (NMFS 2001; Good et al. 2005; Williams et al. 2011; Williams et al. 2016). Given the low abundance and fragmented distribution, 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 (NMFS 2014b).

2.2.3 Climate Change and Other Ecosystem Factors

One factor affecting the rangewide status of the SONCC Coho Salmon ESU, and aquatic habitat in general, is climate change. Climate change has negative implications for designated critical habitats along the Pacific Coast (Climate Impacts Group 2004; Scheuerell and Williams 2005; Zabel et al. 2006; ISAB 2007). Average annual air temperatures have increased by approximately 1.8º F since 1900, or about 50 percent more than the global average over the same period (ISAB 2007). The latest climate models project a warming of 0.1 ºF to 0.6 ºF per decade over the next century. According to the Independent Scientific Advisory Board (ISAB), these effects pose the following impacts over the next 40 years:

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

- With a smaller snowpack, these watersheds will see their runoff diminished 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.
- Water temperatures are expected to rise, especially during the summer months when lower stream-flows co-occur with warmer air temperatures.

These changes will not be spatially homogeneous across the entire Western Coast of the United States. Low-lying areas are likely to be more affected. Climate change may have long-term effects that include, but are not limited to, depletion of important cold water habitat, variation in quality and quantity of tributary rearing habitat, alterations to migration patterns, accelerated embryo development, premature emergence of fry, and increased competition among species (ISAB 2007).

Coho salmon are particularly vulnerable to climate change due to their need for year-round cool water temperatures since they rear for one or more years in freshwater, unlike some other salmonid species (Moyle 2002). By increasing air and water temperatures, climate change is expected to decrease the amount and quality of coho salmon habitat, reducing the productivity of populations, and exacerbating the decline of the species. Climate change effects on stream temperatures within Northern California are already apparent. For example, in the Klamath River, Bartholow (2005) observed an increase in water temperature of 0.5°C per decade since the early 1960s.

In coastal and estuarine ecosystems, the threats from climate change largely come in the form of sea level rise, loss of coastal wetlands, and changes in precipitation patterns. Sea levels are predicted to rise exponentially over the next 100 years, with possibly a 50–80 cm rise by the end of the 21st century (Intergovernmental Panel on Climate Change 2007). This rise in sea level will alter the habitat in estuaries and will either provide increased opportunity for feeding and growth or, in some cases, will lead to the loss of estuarine habitat and a decreased potential for estuarine rearing. Marine ecosystems face a unique set of stressors related to global climate change, all of which may have deleterious impacts on growth and survival while at sea. In general, the effects of changing climate on marine ecosystems are not well understood given the high degree of complexity and the overlapping climate patterns (e.g., El Niño-Southern Oscillation, Pacific Decadal Oscillation, North Pacific Gyre Oscillation etc.). The existing regional climate cycles will interact with global climate changes in unknown and unpredictable ways. Overall, climate change is believed to represent a growing threat which will challenge the resilience of salmonids in Northern California. Section 2.4.2.4 describes more action area-specific information on climate change.

2.2.4 Rangewide Status of Critical Habitat

This section examines relevant critical habitat conditions for the SONCC Coho Salmon ESU. NMFS determines the range-wide status of critical habitat by examining the condition the SONCC Coho Salmon ESU's PBF (also called PCEs, in some designations) that were identified when critical habitat was designated. These features are essential to the conservation of the ESU because they support one or more of the species' life stages (e.g., spawning, rearing, migration, and foraging).

Critical habitat for SONCC coho salmon was designated as all accessible reaches of rivers (including estuarine areas and tributaries) between Cape Blanco, Oregon, and Punta Gorda, California (64 FR 24049, May 5, 1999). Critical habitat includes all waterways, substrate, and

adjacent riparian zones below longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years). Tribal lands that were excluded in the critical habitat designation include: Big Lagoon Rancheria, Blue Lake Rancheria, Elk Valley Rancheria, Hoopa Valley Indian Reservation, Karuk Reservation, Laytonville Rancheria, Quartz Valley Reservation, Resighini Rancheria, Round Valley Reservation, Sherwood Valley Rancheria, Smith River Rancheria, and Yurok Reservation.

In the critical habitat designation, NMFS identified five essential habitat types for SONCC coho salmon: (1) spawning areas; (2) adult migration corridors; (3) juvenile summer and winter rearing areas; (4) juvenile migration corridors; and (5) areas for growth and development to adulthood. Spawning and rearing are often located in small headwater streams and side channels. Adult and juvenile migration corridors include these tributaries as well as mainstem reaches and estuarine zones. Growth and development to adulthood occurs primarily in near-and off-shore marine waters, although final maturation takes place in freshwater tributaries when the adults return to spawn (64 FR 24049, May 5, 1999). Within these areas, essential features of coho salmon critical habitat include adequate substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions. In addition, designated freshwater and estuarine critical habitat includes riparian areas that provide the following functions: shade, sediment, nutrient or chemical regulation, stream bank stability, and input of large woody debris or organic matter (64 FR 24049, May 5, 1999).

Habitat quality in the SONCC coho salmon ESU varies from excellent in wilderness and road-less areas to poor in areas subject to heavy agricultural and urban development. Critical habitat throughout much of the ESU's domain has been degraded by intense agriculture, alteration of stream morphology (i.e., through channel modifications and diking), riparian vegetation disturbance, wetland draining and conversion, livestock grazing, dredging, road construction and maintenance, logging, mining, and urbanization. Reduced summer stream flows, impaired water quality, and reduction of habitat complexity are common problems for critical habitat in developed areas, including those within this ESU domain (NMFS 2014b).

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). For this Proposed Action, the action area includes the lower Trinity River between river mile 0.5 to 12 (Figure 8). This is the geographic area where the HVT TRMP activities (fishing and monitoring) will occur and is the area where SONCC coho salmon will be affected by the action. The action area lies entirely within the HVR, which is excluded from the final critical habitat designation for SONCC coho salmon (64 FR 24049; May 5, 1999) along with other areas within tribal lands.

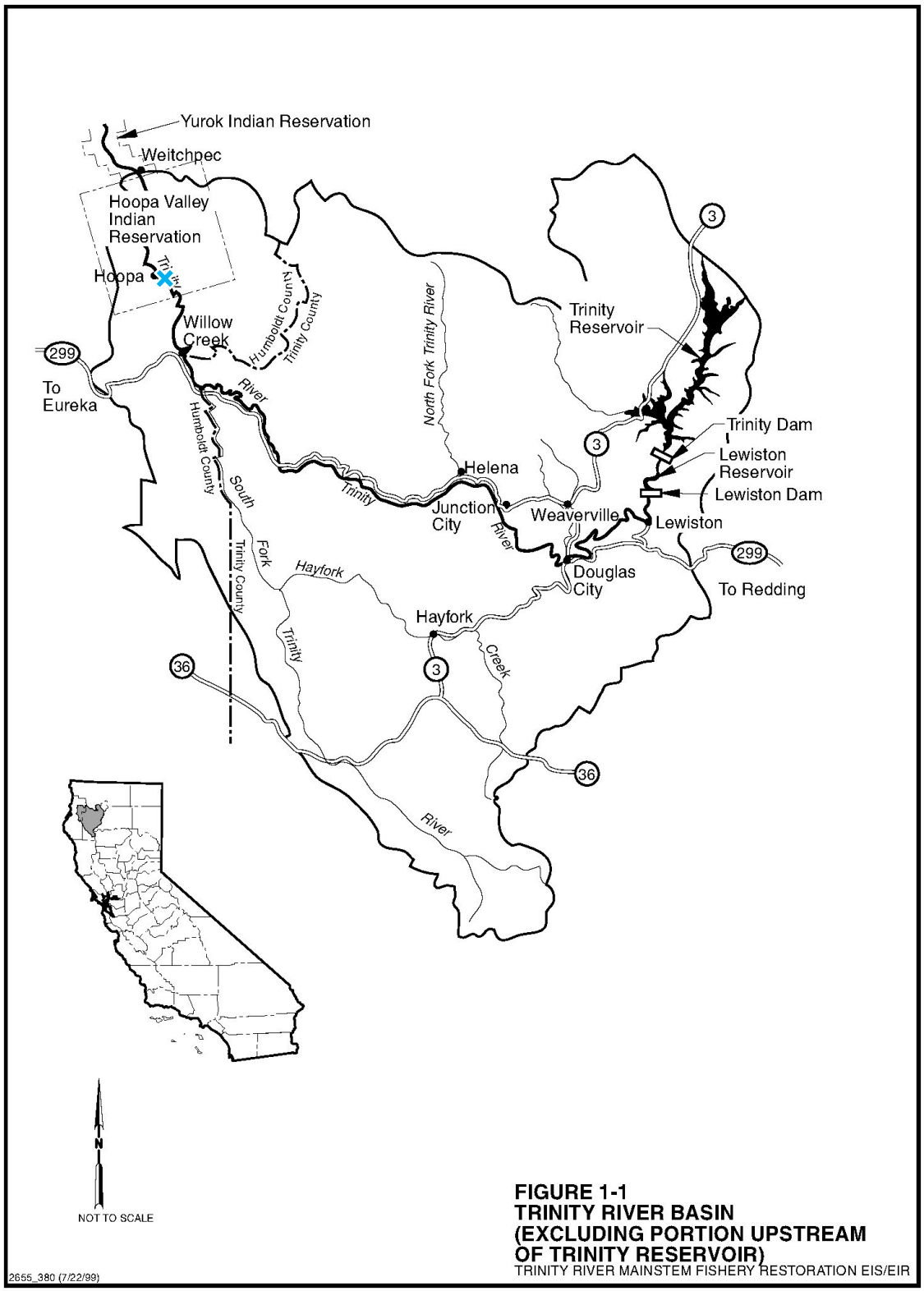

Figure 8. Map of the Trinity River basin. The HVR boundary is indicated by the dotted square. Location of the HVT resistance board weir indicated by a blue X. Map source: (USFWS et al. 2000).

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).

2.4.1 Status of SONCC Coho Salmon in the Action Area

The Trinity River supports three distinct populations of SONCC coho salmon: Lower Trinity River, Upper Trinity River, and the South Fork Trinity River (NMFS 2014b). These population comprise the Interior Trinity Diversity Stratum (Trinity Stratum, hereafter) and all three populations are present in the action area during their freshwater migration.

The Trinity Stratum is important to survival and recovery of the SONCC Coho Salmon ESU. The NMFS Recovery Plan for SONCC coho salmon provides region-specific recovery actions in order to facilitate recovery of this species (NMFS 2014b). Implementation of some of these actions has already begun and more are in the planning phase. The Lower Trinity River and Upper Trinity River are core populations and need to achieve a robust level of adult spawners for recovery of the ESU. At least two of the three Trinity populations must be viable (i.e., low extinction risk) for the ESU to be viable. The status of each population is described in the subsections below. Population designations, extinction risk, and spawner thresholds are shown in Table 5 and Table 6.

Information about the abundance of individual SONCC coho salmon population units within the action area is limited. However, the aggregate abundance of the Trinity Stratum is estimated by the California Department of Fish and Wildlife (CDFW) through data collected at the Willow Creek weir (WCW) on the lower Trinity River (Figure 8). All three populations of the Trinity Stratum pass the WCW and estimates of run size are made for NOR and HOR coho salmon. Currently, there are no methods to differentiate NOR coho salmon into individual populations so the CDFW estimates provide an aggregate estimate for Trinity Stratum coho salmon upstream of the WCW Table 7.

Table 5. Population designations and current extinction risk for Trinity River SONCC coho salmon populations (NMFS 2014b).

Population Unit	Population Type	Population Role	Extinction Risk	Extinction Risk Criteria Used
Lower Trinity River	Potentially independent	Core	High	Spawner Density
Upper Trinity River	Functionally independent	Core	Moderate	Spawner Density
South Fork Trinity River	Functionally independent	Non-Core	High	Spawner Density

Table 6. Spawner thresholds for Trinity River SONCC coho salmon populations (NMFS 2014b).

Population	Low-risk Threshold	High- risk (Depensation) Threshold
Lower Trinity River	3,600	112
South Fork Trinity River	970	242
Upper Trinity River	5,800	365

Table 7. Spawner (NOR + HOR) and recruit data for Trinity populations of SONCC coho salmon (PFMC 2021).

Brood Year	Trinity River		
	Spawners	pHOS	Recruits
1997	2,892	84%	389
1998	5,995	85%	3,850
1999	1,692	73%	589
2000	6,585	96%	4,384
2001	18,715	84%	10,342
2002	7,812	95%	2,983
2003	14,255	77%	1,869
2004	23,117	66%	1,343
2005	11,702	85%	1,471
2006	8,870	84%	622
2007	2,552	63%	973
2008	3,065	72%	1,375
2009	2,156	80%	2,139
2010	2,770	77%	5,753
2011	3,394	71%	1,039
2012	7,912	80%	1,014
2013	12,883	69%	811
2014	7,228	89%	59
2015	625	27%	79
2016	2,901	78%	123
2017	141	76%	--
2018	503	100%	--
2019	421	85%	--
Recent 5- year average	918	73%	417

Lower Trinity River Population

The Lower Trinity River population is a core, potentially independent, population. The population is at high risk of extinction due to low spawner densities (NMFS 2014b). Sufficient spawner densities are needed to maintain connectivity and diversity with at least 112 spawners needed to avoid problems associated with depensation. To contribute to viability of the Trinity Stratum and the SONCC Coho Salmon ESU, the Lower Trinity River Population should have at least 3,600 spawners. There is little information on the abundance of coho salmon in the lower Trinity River, however the population is likely below the depensation threshold (NMFS 2014b).

Good spawning habitat exists in a few tributaries in the lower Trinity River and most of the historic habitat accessible to coho salmon. However, many of the streams are only sporadically occupied. Although not well documented, there appears to be some diversity in life history strategies in the Lower Trinity River including off channel rearing in HVR tributary streams (Hoopa Valley Tribe 2021).

South Fork Trinity River Population

The South Fork Trinity River population is a non-core, functionally independent population. The population is at high risk of extinction due to low spawner densities (NMFS 2014b). To avoid problems associated with depensation, at least 242 spawners are needed each year in the South Fork Trinity River. To contribute to viability of the Trinity Stratum and the ESU, this population should have at least 970 spawners. There is little information on the abundance of coho salmon in the South Fork Trinity River, however, the population is likely below the depensation threshold (NMFS 2014b).

Upper Trinity River Population

The Upper Trinity River population is a core, functionally independent population. The population is at moderate risk of extinction due to low spawner densities. In most years, the population is above the depensation threshold of 365 spawners. To contribute to viability of the Trinity Stratum and the ESU, this population should have at least 5,800 spawners. About 90 percent of the coho salmon returning to the Trinity River are believed to be from the Upper Trinity River Population (PFMC 2021). In some years, it appears that enough spawners returned to the Upper Trinity River the meet the low risk extinction threshold. This population is subject to very high hatchery contribution (0.83 percent) from coho salmon produced at TRH.

2.4.2 Factors Affecting SONCC Coho Salmon Populations in the Action Area.

There are a variety of factors affecting SONCC coho salmon in the action area, most of which have a negative effect on SONCC coho salmon (Table 8). Trinity Stratum coho salmon have been severely impacted due to a variety of land use and anthropogenic activities in the region. Mining, timber harvesting, production of hatchery fish, agriculture, road construction, recreational land use, and some residential development have all impacted these populations (NMFS 2014b). The construction of Trinity and Lewiston dams in the early 1960s, and the subsequent diversion of water to the Sacramento Valley, has severely impacted the natural flow regime of the Trinity River (NMFS 2014b). This shift in the natural hydrology of the river has led to substantial degradation of salmonid habitat. Spawning habitat and rearing habitat have been particularly degraded over time resulting in disconnection of the floodplain, lack of large woody debris, poor riparian conditions, sediment accretion, and a decrease in the number of deep pools in the river. Sedimentation, channelization, and channel confinement have also increased within the Trinity River and flows are

often too low to create optimal water temperatures for salmonids (U.S. Department of the Interior 2000; NMFS 2014b). Information pertaining to key limiting stresses and threats for the Trinity populations are in Table 9 and Table 10. In the following subsections, we discuss hatchery production, habitat restoration, harvest, and climate change in detail.

Table 8. Factors affecting coho salmon in the action area (NMFS 2022b).

Factors	Effect	Stressors
Forestry Activities	Negative	Sedimentation of spawning gravels, increased water temp, loss of LWD, poor water quality, reduced pool frequency and depth
Roads	Negative	Sedimentation, habitat blockage, reduced pool frequency and depth
Hatchery Activities	Negative and positive	Negative: Genetic and ecological interactions. Positive: Demographic support at low run sizes, marine derived nutrients.
Climate Change	Negative	Warming water temperatures, reductions in summer and fall streamflow
Agriculture	Negative	Sedimentation, decrease in water quality, decrease in summer base flows, riparian habitat loss
Urban, residential, and industrial development	Negative	Urban non-point pollution runoff, increased water utilization, channelization, riparian habitat loss
Water Diversions	Negative	Loss or reduction of summer baseflow (tributaries other than mainstem Trinity River), habitat reduction, increase in water temperatures, hydrologic alteration, habitat reductions.
Restoration	Positive	Addition of LWD, increase in habitat quantity and quality
Fisheries	Negative	Mortality of returning adults and jacks

Table 9. Key limiting stresses and threats for Trinity River populations of coho salmon (NMFS 2014b).

Population	Key Limiting Stresses		Key Limiting Threats	
Lower Trinity River	Lack of floodplain and channel structure	Altered hydrologic function	Channelization & Diking	Hatcheries
South Fork Trinity River	Altered hydrologic function	Impaired water quality	Dams & Diversions	Roads
Upper Trinity River	Altered hydrologic function	Adverse hatchery related effects	Dams & Diversions	Hatcheries

Table 10. Severity ranking for stress and threat from fisheries and scientific collecting for Trinity River populations (NMFS 2014b).

Population	Stress from Adverse Fishery- and Collection- Related Effects	Threat from Fishing and Collecting
South Fork Trinity River	Low	Low
Lower Trinity River	Low	Low
Upper Trinity River	Low	Low

2.4.2.1 Hatchery Production

Hatcheries can provide benefits to salmonid populations by reducing demographic risks and preserving genetic traits for populations at low abundance, or in areas where habitat is significantly degraded (PFMC 2021). In addition, hatchery fish can help to provide harvest opportunities where existing populations would not otherwise support harvest.

Hatcheries can also pose a significant threat to some populations of salmonids through a variety of ecological mechanisms such as increased competition (Nickelson et al. 1986; NRC 1996; McMichael et al. 1997), predation (Sholes and Hallock 1979; HSRG 2004), genetic dilution (NRC 1996), and disease transmission (Goede 1986; NRC 1996; Coutant 1998; Moffitt et al. 1998). Adverse hatchery-related effects pose a very high threat in the Trinity River (NMFS 2020a). Hatchery-origin coho salmon make up most of the spawning run to the Trinity River each year where pHOS has ranged between 36 and 100 percent across the Trinity River populations (NMFS 2014b) with a recent 5-year average of 73 percent (Table 7). Hatchery fish released from two programs are present in the action area. TRH releases coho salmon, fall Chinook salmon and steelhead and the HVT program releases coho salmon. Releases from these programs are shown in Table 11 and are described further below. NMFS reviewed these programs and determined that they would not jeopardize SONCC coho salmon (NMFS 2018b; 2020a; 2022b).

Table 11. Hatchery, species, production goal, release location and marking/tagging of salmonids released in the Trinity River (NMFS 2018b; 2020a; 2022b).

Hatchery	Species	Production Goal	Release Location	Marking/Tagging
Trinity River	Coho	300,000	Trinity River	Right Maxillary Clip
	Spring Chinook	1,400,000		Adipose Clip + CWT
	Fall Chinook	2,900,000		Adipose Clip + CWT
	Steelhead	448,000		Adipose Clip
Hoopa Valley Tribe	Coho	200,000	Lower Trinity Tributaries	Adipose Clip + CWT

Trinity River Hatchery

TRH is located on the Trinity River (RM 110), in California, at the base of Lewiston Dam (Figure 8). TRH releases Chinook salmon, coho salmon, and steelhead to mitigate for the loss of salmonid habitat and harvest opportunities resulting from the construction of the Trinity and Lewiston dams

and the operation of the Central Valley Project. The TRH coho salmon program is operated as an integrated program to increase total adult abundance, productivity, and fitness, while minimizing genetic divergence of hatchery broodstock from NOR coho salmon. Objectives for the TRH coho salmon program are to achieve a pHOS of less than 30 percent in the Upper Trinity population and a pHOS of five percent in the South Fork Trinity and Lower Trinity populations (NMFS 2020a).

All TRH programs are operated to provide fish for harvest in a manner consistent with the conservation of Trinity River populations of SONCC coho salmon. HGMPs have been completed for each of the TRH programs and the effects on SONCC coho salmon were considered in NMFS biological opinions (NMFS 2018b; 2020a). The TRH coho salmon program is operated as an integrated program with the goal of increasing adult abundance, productivity, and fitness while minimizing genetic divergence of hatchery broodstock from the naturally spawning population. NMFS (2020a) concluded that the TRH coho salmon program contains adequate measures to reduce the threat of TRH to SONCC coho salmon.

Hoopa Valley Tribe Hatchery

The HVT recently completed a HGMP for rearing of coho salmon at the HVT Hatchery (HVTH) for release into Trinity River tributaries within the HVR. The objective of the HGMP is to encourage reseeding of HVT tributaries with coho salmon and provide for harvest benefits while minimizing ecological and genetic impacts on SONCC coho salmon. The limited data available from the U.S. Forest Service and the HVT for the Lower Trinity River population suggests that much of the habitat in the Lower Trinity River is currently unoccupied or only sporadically occupied. The HVT HGMP was considered in a NMFS biological opinion (NMFS 2022b). NMFS believes the benefits from augmenting these unoccupied tributaries on the HVR will outweigh the potential effects on diversity from the hatchery releases. NMFS (2022b) concluded that the HVTH program will be beneficial for coho salmon by increasing abundance, spatial structure, productivity, and diversity.

2.4.2.2 Habitat Restoration in the Action Area

Restoration activities in the Trinity River basin are ongoing under the Trinity River Restoration Program (TRRP). The TRRP is a multi-agency program whose purpose is to mitigate for impacts on anadromous fish populations from dam construction and water diversions associated with the Trinity River Division of the Central Valley Project. In 2020, NMFS approved a TRRP proposal for restoration activities in the Trinity River and lower Klamath basin (NMFS 2020b). The restoration activities are designed to increase salmon and steelhead production by reestablishing habitat forming processes and complex instream habitat for salmonids. Activities will provide long-term benefits to conditions for coho salmon in the mainstem and tributaries by improving and restoring channel structure and habitat complexity, floodplain connectivity, riparian vegetation structure and diversity, and by reducing excess accumulations of fine sediment in the river channel and sediment loads entering the river from tributaries (NMFS 2020b). Restored habitat resulting from restoration projects should improve adult spawning success, juvenile survival, and smolt outmigration, which will lead to improved abundance, productivity, spatial structure, and diversity within each affected coho salmon population (NMFS 2020b).

2.4.2.3 Fisheries affecting SONCC coho salmon in the Action Area

Fisheries that occur in the action area include recreational fisheries (non-tribal) and the HVT fisheries. The effect of these fisheries on Trinity Stratum coho salmon is shown in Table 14. The recreational fisheries are managed by CDFW, retention of coho salmon is prohibited, and impacts on SONCC coho salmon are very low to nonexistent. The HVT fisheries are described in the Proposed Action (Section 1.3.5) and in the effects of the action (Section 2.5.3).

Trinity Stratum coho salmon are impacted in other fisheries outside of the action area. These fisheries include the Yurok Tribe's fisheries and recreational fisheries in the Klamath River, and the ocean fisheries managed by the PFMC. The effect of these fisheries is shown in Table 14.

2.4.2.4 Climate Change in the Action Area

In Section 2.2.3, we describe the on-going and anticipated temperature, freshwater, and marine effects of climate change on the ESU. In this section, we summarize the available information on climate change in the action area. The past and present impacts of climate change are reflected in the most recent status of the species, which is summarized in Section 2.2. Climate change effects regarding future potential impacts are considered in Section 2.6.

Figure 9 and Figure 10 show projections for daily temperature and precipitation for Hoopa, CA (http://www.cal-adapt.org). The data presented here recreate the historical climate for the period 1950 to 2005 and show predictions for the period of 2006 to 2100. These local projections are created by downscaling global climate models using the Localized Constructed Analogues statistical method (Pierce et al. 2018). The future climate projections use scenarios for greenhouse gas and aerosol emissions that represent a set of assumptions of humanity's trajectory in the coming years. The Medium Emissions Scenario represents a mitigation scenario where global CO_2 emissions peak by 2040 and then decline. The High Emissions Scenario represents a scenario where CO_2 emissions continue to rise throughout the 21st century. Projections for air temperatures are expected to increase about 4°F to 8°F for the medium and high emissions scenario, respectively, when compared to present (Figure 9). For precipitation, the projections for both scenarios and not expected to change significantly from the present to year 2100 (Figure 10).

Climate change effects on stream temperatures within Northern California are already apparent (Bartholow 2005). In addition, there has already been a significant loss of snowpack because of rising temperatures (Mote et al. 2018). Increased air and water temperatures and decreased stream flows, are likely to decrease the amount and quality of habitat available to coho salmon in the action area.

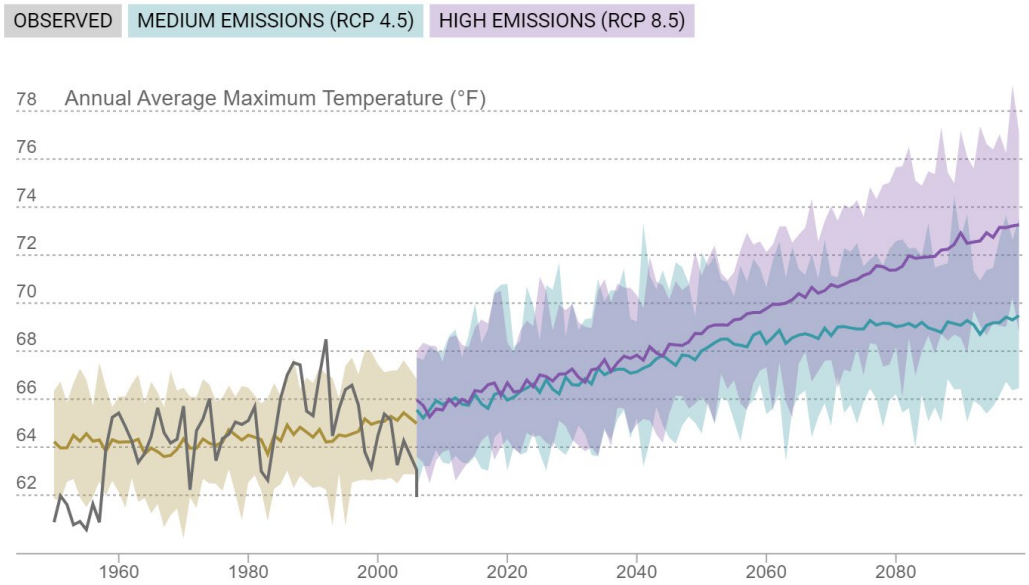

Figure 9. Annual average of the hottest daily temperatures by year for Hoopa, CA. The black line represents historical observed values for each year from 1950-2005. The blue and purple lines represent the most likely outcome for the medium emissions and high emissions scenario, respectively. The shaded area is the range of climate projections for each scenario. Source: https://cal-adapt.org/tools/local-climate-change-snapshot

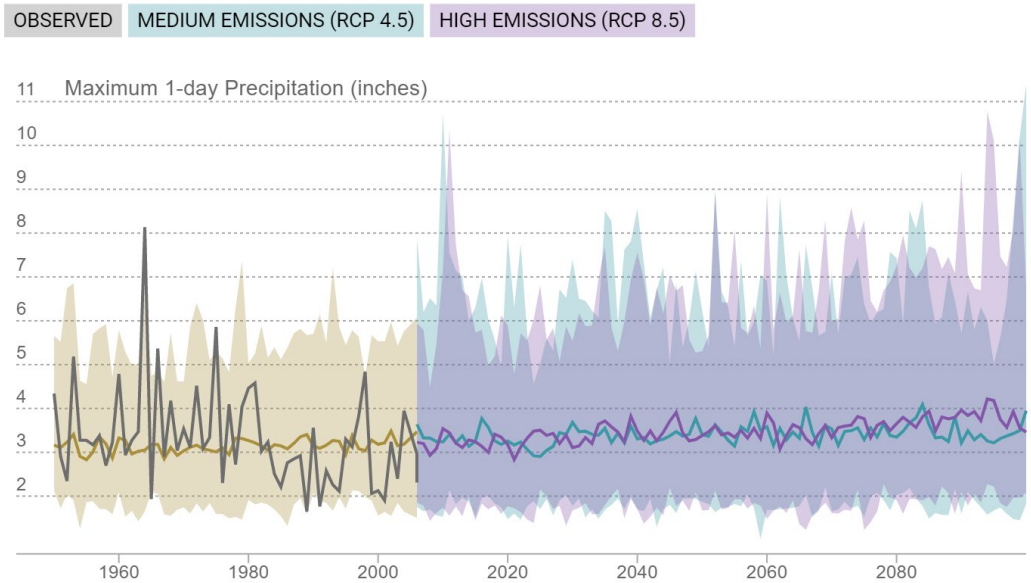

Figure 10. Maximum daily precipitation by year for Hoopa, CA. The black line represents historical observed values for each year from 1950-2005. The blue and purple lines represent the most likely outcome for the medium emissions and high emissions scenarios, respectively. The shaded area is the range of climate projections for reach scenario. Source: https://cal-adapt.org/tools/local-climate-change-snapshot

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 Evaluation Approach

The Proposed Action will affect the Upper Trinity River, Lower Trinity River, and South Fork Trinity River populations of the SONCC Coho Salmon ESU (see Section 2.4.1 for more information on the individual populations). Currently, there are no methods available for distinguishing individual coho salmon from the three populations. In fisheries where it is not possible to distinguish individual populations, a stock surrogate may be used to represent salmon populations that 1) can be managed as a single group, 2) are exposed to similar fishery-related impacts and/or 3) they represent the smallest unit of fish that can be enumerated and monitored. The use of stocks surrogates to assess effects on ESA-listed salmon and steelhead species has been useful and effective in other areas (NMFS 2008; 2018a). For this analysis, we will use the Trinity Stratum as a stock surrogate with the assumption that effects on each individual population will be equal to the effect on the Trinity Stratum. For example, a given HR on the Trinity Stratum would represent the same HR for each population. We believe that this is an appropriate assumption because the fisheries will occur across migration period for coho salmon and all populations will be affected at the same rate.

For the overall assessment of the effects of the Proposed Action, we will utilize the information provided in the HVT TRMP (Hoopa Valley Tribe 2021), the NMFS ERD (NMFS 2022c), and this opinion. To assess the effects of the Proposed Action, we rely on the SONCC Harvest Control Rule (HCR) Risk Assessment (RA) that was recently completed by the PFMC (2021). The RA uses the best available information relative to population status, evaluates the risk to the SONCC Coho Salmon ESU from harvest in marine and freshwater environments, and specifically modeled the effects of fixed exploitation rates (ER) on the risk of falling below critical wild abundance thresholds. The modeling approach and results are described in detail in the RA (PFMC 2021).

2.5.2 Effects on Coho Salmon

Coho salmon will be captured, handled, and harvested under the Proposed Action. In this subsection, we describe the effects on individual coho salmon in the two fisheries of the Proposed Action. The effect on individual coho salmon will vary depending on whether they are encountered in the ITMF or the selective harvest weir. In the ITMF, coho salmon will be harvested (captured and retained) using gillnets and hook and line. This will result in the mortality of the coho salmon that are harvested. The weir fishery will be selective for hatchery coho salmon meaning that HOR coho salmon will be retained and NOR coho salmon will be released. During the weir fishery, coho salmon will swim voluntarily into the weir where they will be captured in a submerged holding pen. HOR coho salmon will be harvested and NOR coho salmon will be handled and released upstream of the weir.

When fish are captured and handled they can be exposed to air, physical trauma, and potential infections which can lead to stress, injury, or death. Stress in fish can be debilitating, can increase

the vulnerability to subsequent challenges, and, if severe enough, can lead to death (Sharpe et al. 1998). These effects can result in mortality that occurs immediately or at a later time. For the HVT weir, we assume that three percent of the coho salmon released will die. This incidental mortality rate is based on existing studies and NMFS reviews that considered the rate of incidental mortality for salmon handled in other fish weirs (NMFS 2011; 2014a; 2017a; 2017b) (See section 1.3.5).

The physical presence of a weir can affect salmonid behavior by delaying upstream migration (delay) or by causing them to avoid the weir structure (rejection). However, these effects are extremely difficult to measure or quantify as there is no realistic way to accurately survey weir rejection or delay as it is occurring (NMFS 2014a; 2017a). The Proposed Action includes several measures to minimize any potential delay or rejection (see Section 1.3.4). The incidental mortality rate associated with fish handled at the weir will account for the ancillary effects of the presence of the weir.

The TRMP monitoring and evaluation programs to collect data and assess compliance and effectiveness of the TRMP. The monitoring efforts are not expected to result in effects to ESA-listed species beyond the effects included in the ITMF and weir fisheries because the monitoring efforts do not involve additional handling or activities that would result in additional encounters or behavioral changes of coho salmon.

2.5.3 Effects on the SONCC Coho Salmon ESU

The effect of the Proposed Action will be the combined mortality of coho salmon from the ITMF and the selective harvest weir. For this analysis we use the common metric, HR (described above, see section 1.3.5), to represent the mortality of NOR coho salmon from: 1) capture and retention in the ITMF and 2) capture and release in the weir fishery. For evaluating the Proposed Action, we consider the HR of NOR coho salmon to be an appropriate indicator of the effects on Trinity Stratum coho salmon. In this section, we describe the magnitude of the effect of the Proposed Action on SONCC coho salmon.

The HR for the Proposed Action is expected to stay within the range observed for the fisheries during 2001 to 2019. The proposed fisheries will be managed not to exceed a three-year average HR of 5.45 percent. The HR in a given year will be assessed post-season in combination with the previous two years (i.e., a three-year rolling average). Table 12 shows the historical (expected) and maximum HR for NOR coho salmon (see Section 1.3.5 for more information on the HR). To estimate the effect of the Proposed Action on numbers of NOR coho, we apply the HR to the number of coho salmon that could be expected to return in a given year. To do this, we use the average (geometric mean) return of NOR coho salmon from existing data and apply the average HR and maximum expected HR. Table 13 provides the average return of NOR coho salmon and mortalities resulting from the Proposed Action.

Table 12. Historical (2001 to 2019, excluding 2018) and expected harvest rates for the HVT fisheries on NOR coho salmon.

Fishery	Gear	Mark Selective	Historical Harvest Rate		Maximum Three-Year Rolling Average Expected
			Range	Average	
Individual Tribal Member Fishery	Gillnets Hook and line	No	0 to 8.0%	3.0%	5.0%
Selective Harvest Weir	Floating resistance board weir	Yes	0 to 1.1%	0.45%	0.45%

Table 13. Average (geomean, years 2001 through 2019) NOR coho salmon return, average and maximum HR expected from the Proposed Action, and resulting mortalities of NOR coho salmon in the Trinity River.

Stock	Average Return	Expected mortalities	
		Average HR (3.0%)	Maximum HR (5.45%)
Trinity Stratum coho salmon (NORs)	901	27	49

The effect of the fisheries in the Proposed Action is quantified as an HR, which is the mortality from the fishery relative to the localized abundance of a species or population in a given year. This metric is often used in terminal freshwater areas. In the Proposed Action, the abundance (i.e., denominator in the HR calculation) is the number of adult NOR coho salmon that returned to the Trinity River and the harvest (i.e., numerator) is the amount of NOR coho salmon kept or killed in the HVT fisheries.

To assess the effects of the action on the Trinity Stratum and SONCC Coho Salmon ESU, we rely on the SONCC RA (PFMC 2021). The RA quantified the effect of the fisheries as an ER, which is the mortality from a fishery relative to the total coast-wide abundance of a species or population. ERs by fishery on Trinity Stratum coho salmon are summarized in Table 14 below. Using the same years considered in the historical assessment of the HR (above), we can estimate the ER equivalent of the Proposed Action. For years 2001 to 2019 (excluding 2018), the average ER for the HVT fisheries is 2.8 percent.

The RA modeled the effects of fixed ERs on the extinction risk for individual and aggregate populations (Figure 11). This information allows us to assess the relative extinction risk to the Trinity Stratum from the fisheries proposed in the TRMP. To estimate the relative risk from the HVT fisheries, we compare the risk of the ER equivalent of the fisheries described in the TRMP to the risk in the absence of all fishing. Under a zero-fishing scenario, the Trinity Stratum stock is at high risk (64 percent probability) of extinction in the short-term (next 20 years) Figure 11. From this, it is apparent that Trinity Stratum is at high risk in the absence of harvest. That is, whether or not these populations can persist over the long term is largely dependent on factors other than fishing. Using the ER equivalent of the HVT fisheries (2.8 percent) and the modeled risk from the RA (Figure 11), the increase in short-term risk from this ER is less than five percent when compared to a zero-fishing scenario (Figure 11). This increased risk is very low for the Trinity Stratum coho salmon.

Recently, NMFS completed a biological opinion evaluating the effect of fisheries managed by the PFMC on the SONCC Coho Salmon ESU (NMFS 2022a). The biological opinion considered the impacts of ocean and freshwater fisheries under a HCR for ER limits of 16 percent for the Trinity River populations and 15 percent for all other populations of the SONCC Coho Salmon ESU. NMFS (2022a) determined that implementation of the HCR (including the maximum ER limit of 16 percent on the Trinity Stratum) would not jeopardize the SONCC Coho Salmon ESU. This is relevant to our consideration of effects of Proposed Action because the HVT fisheries were considered as part of the baseline in that consultation and are included in the overall maximum ER limits in NMFS's 2022 assessment (NMFS 2022a).

Table 14. Exploitation rate of SONCC coho salmon originating from the Trinity River in ocean, tribal, and freshwater recreational fisheries.

Year	Exploitation Rate					
	Ocean fisheries	**Yurok Tribe fisheries**	**Hoopa Valley Tribe fisheries**	**Klamath River Recreational fisheries**	**Trinity River Recreational fisheries**	**Total**
2001	2.4%	12.9%	2.8%	0.3%	0.0%	18.4%
2002	5.2%	11.0%	3.6%	0.9%	0.0%	20.7%
2003	8.1%	1.5%	0.4%	0.1%	0.0%	10.1%
2004	7.9%	4.4%	0.9%	0.1%	0.0%	13.3%
2005	5.3%	4.5%	0.7%	0.0%	0.0%	10.5%
2006	5.6%	6.7%	1.9%	0.0%	0.0%	14.2%
2007	10.1%	2.4%	1.0%	0.0%	0.0%	13.5%
2008	1.1%	9.8%	4.2%	0.4%	0.0%	15.6%
2009	1.5%	7.9%	4.1%	1.0%	0.0%	14.5%
2010	1.7%	6.7%	6.4%	0.5%	0.0%	15.3%
2011	3.1%	6.1%	1.6%	0.6%	0.0%	11.4%
2012	10.1%	5.1%	0.3%	0.6%	0.0%	16.1%
2013	10.6%	10.1%	2.6%	0.4%	0.0%	23.7%
2014	4.3%	0.8%	5.0%	2.7%	0.0%	12.8%
2015	11.0%	8.4%	5.5%	0.3%	0.0%	25.3%
2016	4.8%	5.4%	1.6%	0.0%	0.0%	11.9%
2017	3.3%	0.3%	0.0%	0.0%	0.0%	3.6%
2018*	3.0%	6.7%	37.9%	0.0%	0.0%	47.7%
2019	3.3%	3.9%	8.0%	0.0%	0.0%	15.2%

* The 2018 ER is considered an outlier due high uncertainty in abundance estimates (Hoopa Valley Tribe 2021; PFMC 2021).

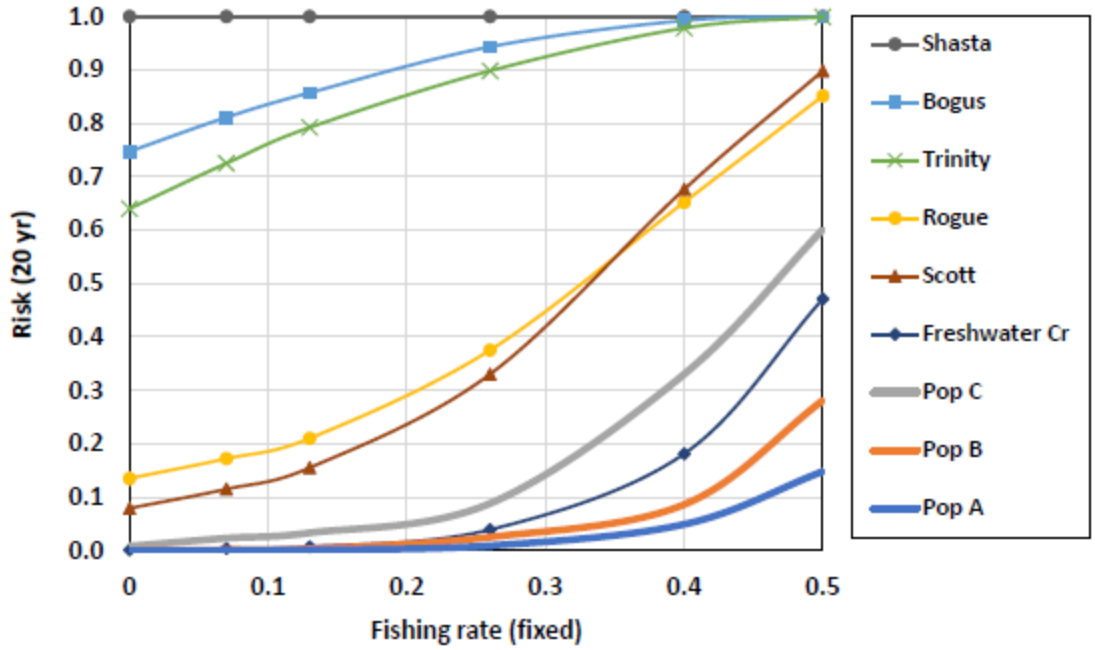

Figure 11. Modeled effects of fixed ERs on the risk of falling below critical wild population abundance thresholds (PFMC 2021).

2.5.4 Effects on Critical Habitat

Critical habitat for the SONCC Coho Salmon ESU was designated in 1999 (64 FR 24049; 64 FR 24049). Tribal lands were specifically excluded from the critical habitat designation, including the HVR. All activities considered in this opinion occur inside the HVR (see Section 2.3) and therefore there will be no effects on critical habitat.

2.6 Cumulative Effects

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

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

2.6.1 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 create chronic sediment erosion that can negatively affect coho salmon 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 salmon to be exposed to lethal amounts of the retardant. This exposure is most likely to affect summer rearing juvenile coho salmon. As wildfires are stochastic events, we cannot determine the extent to which suitable coho salmon habitat may be removed or modified by these activities.

2.6.2 Residential development and existing residential infrastructure

Human population growth in the action area is expected to remain relatively stable as there are no known plans for increasing the rate of development on the HVR. The population of people living on the HVR is not expected to increase markedly over the next ten years. Minimal impacts from water use on the HVR are expected to continue to occur throughout the duration of the Proposed Action. The presence of structures and/or roads near waters has led to channelization and simplification of stream channels.

2.6.3 Recreation

Construction of summer dams to create swimming holes causes turbidity, destroys and degrades habitat, and blocks migration of juvenile salmonids between summer habitats. Impacts to salmonid habitat are expected to be localized, mild to moderate, and temporary. Non-tribal fishing within the action area, typically for steelhead or Chinook salmon, is expected to continue subject to CDFW regulations. The level of impact to coho salmon within the action area from angling is unknown, but is expected to remain at current levels because there is no information suggesting that angling will increase or decrease.

2.7 Integration and Synthesis

The Integration and Synthesis section is the final step in assessing the risk that the Proposed Action poses to species and critical habitat. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the Proposed Action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

Rangewide Status of the Species

- The status of the SONCC Coho Salmon ESU is described in Section 2.2. Best available information indicates that the SONCC Coho Salmon ESU remains threatened. Critical habitat for the SONCC Coho Salmon ESU has been designated but tribal lands are specifically excluded from the designation. A recovery plan was finalized in 2014 and status of the ESU was evaluated in 2016. A new status review is currently underway.
- The SONCC Coho Salmon ESU includes seven diversity strata comprising 40 populations. Long-term trends of abundance are not available for many of the populations. However, available information indicates that spawner abundance has declined for many of the populations in the ESU and most of the independent populations at high risk of extinction because of low spawner abundance. Information is limited but available data indicate that

distribution of SONCC coho salmon is reduced and fragmented and genetic and life history diversity is likely very low and is inadequate to contribute to a viable ESU.
- Climate change is negatively affecting the rangewide status and habitat of the SONCC Coho Salmon ESU and is a growing threat that will challenge the resilience of all salmonids in Northern California and Southern Oregon.

Environmental baseline

- The environmental baseline (Section 2.4) considers the condition of SONCC coho salmon in the Trinity River. The Trinity River supports three distinct populations of SONCC coho salmon: Lower Trinity River, Upper Trinity River, and the South Fork Trinity River. These populations comprise the Trinity Stratum of the SONCC Coho Salmon ESU.
- The Trinity Stratum is important to survival and recovery of the SONCC Coho Salmon ESU. The Lower Trinity River and Upper Trinity River populations must achieve a robust level of adult spawners for recovery of the ESU. At least two of the Trinity populations must be viable for the ESU to be viable. The Lower Trinity River and South Fork Trinity River populations are at high risk of extinction due to low spawner densities. The Upper Trinity River population meets the low risk extinction threshold in some years. However, the population is subject to very high pHOS.
- Two hatchery programs release hatchery coho salmon in the Trinity River. The programs are integrated programs with the goal of increasing adult abundance, productivity, and fitness while minimizing genetic divergence of hatchery broodstock from the naturally spawning population. NMFS has reviewed the hatchery programs and determined that they contain measures to reduce the threat of hatchery production on coho salmon and are likely to provide benefits to the SONCC Coho Salmon ESU.
- Coho salmon in the Trinity River have been severely impacted by a variety of land use and anthropogenic activities. The key limiting stresses and threats include altered hydrologic function, impaired water quality, channelization, dams, water diversions, and production of hatchery fish. Fisheries are not a key limiting factor and the severity of stress and threat from fisheries is low.
- NMFS recently approved multiple TRRP restoration projects to be completed in the Trinity River. TRRP restoration activities are designed to increase in-river salmon and steelhead production by reestablishing habitat forming processes and complex instream habitat for salmonids. The implementation of the TRRP is expected to have immediate and long-term positive effects on salmonid habitat in the Trinity River.
- Climate projections for air temperatures are expected to increase in the action area and precipitation is not expected to change significantly. Climate change effects on stream temperatures within Northern California are already apparent and there has already been a significant loss of snowpack.

Cumulative Effects

- Cumulative effects are described in Section 2.6. Control of wildfires, residential development, and recreation may all negatively affect SONCC coho salmon. However, the level of effects, while unquantifiable, is not expected to increase.

Effects of the action

- The effects of the Proposed Action are described in Section 2.5. The action will affect coho salmon through capture, handling, and harvest and/or release. In the ITMF, coho salmon will be harvested. In the weir fishery HOR coho salmon will be harvested and NOR coho salmon will be released.
- The effect of the Proposed Action on the SONCC Coho Salmon ESU will be the combined mortality of coho salmon from the ITMF and weir fishery. The conduct of the fisheries and resulting harvest are expected to stay within the range observed for the fisheries during 2001 to 2019. The fisheries will be managed not to exceed a three-year average HR of 5.45 percent. The ER equivalent of the fisheries is 2.8 percent. The short-term risk presented by this level of harvest is very low, less than a five percent increase, when compared to a zero-fishing scenario.
- NMFS completed a biological opinion on the fisheries managed by the PFMC that impact the SONCC Coho Salmon ESU. The HVT fisheries are included in the ER evaluated in that opinion. The biological opinion determined that implementation of PFMC fisheries would not jeopardize the SONCC Coho Salmon ESU.

In summary, we have considered the effects of the Proposed Action together with the rangewide status of the species, the conditions in the environmental baseline, and cumulative effects. While the status of the ESU indicates it is at moderate to high demographic risk, actions are in place to address primary threats for populations of the SONCC Coho Salmon ESU through the SONCC Coho Recovery Plan. In the Trinity River basin, multiple restoration projects and improved hatchery practices are anticipated to improve productivity, abundance, spatial structure, and diversity for Trinity Stratum coho salmon. Information on SONCC coho salmon has improved through the development of the SONCC Coho RA allowing us to quantitatively assess the risk of fisheries. We reviewed the effects of the Proposed Action and determined that the risk is low (<5 percent) for the affected populations. We conclude the Proposed Action would not impede the long-term survival or the recovery of Trinity Stratum coho salmon and therefore of the SONCC ESU as a whole. We acknowledge that the effects of climate change will continue to adversely affect the SONCC coho salmon and there is uncertainty in the level of effects. However, we do not believe this alters our conclusions that the Proposed Action is not likely to reduce appreciably the likelihood of both survival and recovery of SONCC Coho Salmon ESU.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species, the environmental baseline within the action area, the effects of the Proposed Action, any effects of interrelated and interdependent activities, and the cumulative effects, it is NMFS' biological opinion that the Proposed Action is not likely to jeopardize the continued existence of the SONCC Coho Salmon ESU.

2.9 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat

modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Harass" is further defined by interim guidance as to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering." "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

Take of SONCC coho salmon under the TRMP will be direct take as the proposed fisheries target listed SONCC coho. There is no incidental take of ESA-listed species from the Proposed Action considered in this opinion. For this reason, further exemption from the ESA take prohibitions is not appropriate. Nonetheless, the level of take is described in Section 2.5.3 above.

2.10 Conservation Recommendations

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

1. NMFS, in collaboration with the HVT, should investigate forecasting methods for SONCC coho population or population aggregates as more data become available (e.g., use of hatchery proxies for forecasting), decisions are made about production (e.g., Trinity River Hatchery), or the effects of Klamath dam removal become known.
2. NMFS, in collaboration and the HVT should continue to investigate increases in monitoring including expansion of spawning ground surveys to aid the ability to assess impacts to wild SONCC coho salmon.
3. Methods to generate preseason projections of harvest impacts should be developed.
4. NMFS, in collaboration with the HVT should continue to improve the quality of information gathered on marine survival and ocean rearing and migration patterns to improve the understanding of the utilization and importance of these areas to listed Pacific salmon.

2.11 Reinitiation of Consultation

This concludes formal consultation for Tribal 4(d) Rule determination for the TRMP submitted by the Hoopa Valley Tribe. NMFS will review the extent of take annually to ensure that the amount or extent of take considered in this opinion is not exceeded. The HR on NOR coho salmon is expected to stay within the range observed for the fisheries during 2001 to 2019. The proposed fisheries will be managed not to exceed a three-year average HR of 5.45 percent on NOR coho salmon (See Table 12). If the take is exceeded, NMFS will consult with the HVT to determine specific measures that can be implemented to reduce take or implement further analysis of the impacts on listed species. If the amount and extent of take cannot be reduced to levels considered in this opinion, NMFS will reinitiate consultation. Because there is no definitive sunset (or expiration) date for the TRMP

approvals, there is no pre-determined end date on this opinion. After the first three years of implementation, NMFS and HVT will reevaluate the performance of the TRMP.

The re-evaluation will consider the performance of the TRMP using the identified performance standards and indicators and will compare the observed HRs with the expectations and effects considered in the ERD and this opinion. Upon re-evaluation, NMFS and HVT will consider whether the TRMP is meeting the objectives and whether the HRs are within the limits described in this opinion.

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

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

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

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

3.1 Essential Fish Habitat Affected by the Project

For this EFH consultation, the action area and Proposed Action are described in detail above in Sections 2.3 and 1.3, respectively. The action area includes EFH identified for Chinook and coho salmon (PFMC 2014).

The PFMC assessed the effects of fishing on salmon EFH, identified activities related to fishing, and described the effects of the activities in Appendix A to Amendment 18 of the Pacific Coast Salmon Plan (PFMC 2014). For freshwater habitats, the activities and effects include:

- Fishing Activities: Fishing includes the activities below and the direct effects from the presence of the people in the water. During fishing activities people may impact juvenile salmon and eggs by walking in the streams (PFMC 2014).
- Derelict Gear: When gear associated with fishing breaks free, is abandoned, or becomes otherwise lost in the aquatic environment, it becomes derelict gear. Derelict fishing gear can affect salmon EFH if it becomes a barrier to fish passage and can directly affect salmon by entanglement (PFMC 2014).
- Vessel Operation: Activities associated with the operation and maintenance of vessels can directly and indirectly impact EFH through wake and wave generation; anchor chain and propeller scour; noise and chemical pollution due to vessel operation and waste discharge; and transport of invasive species (PFMC 2014).
- Carcass Removal: Salmon carcasses provide vital nutrients to stream and lake ecosystems (Scheuerell et al. 2005). Fishing activities remove a portion of returning adults that would otherwise supply nutrients to stream systems. This is especially relevant to nutrient-poor streams that depend on the phosphorous, nitrogen, and other nutrients provided by salmon carcasses (PFMC 2014).

3.2 Adverse Effects on Essential Fish Habitat

Based on information in the TRMP and the analysis presented in the ESA consultation above, NMFS concludes that the effects of the Proposed Action on EFH will be minimal. The HVT fisheries will occur from boats and along the river bank. Vessels are small crafts and any impacts would be short term and transitory in nature. The gear used in the ITMF (gillnets, hook and line) will actively avoid contact with the substrate to avoid interference with fishing and potential loss of gear. The selective harvest weir will be anchored to the substrate temporarily (maximum 60 days) and will occupy an insignificant amount of space compared to the overall substrate in the action area and the Trinity River. The effect of harvest of coho salmon is considered in the Biological Opinion and the removal of salmon carcasses will be discountable. Based on this, the effects of the Proposed Action will not contribute to a decline in the values of the habitat and is unlikely to adversely affect EFH for Chinook salmon and coho salmon.

3.3 Essential Fish Habitat Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA, NMFS is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. NMFS is not providing any EFH conservation recommendations for salmon EFH because the Proposed Action will not have an adverse effect on salmon EFH.

3.4 Statutory Response Requirement

Because there are no conservation recommendations, there are no statutory response requirements.

3.5 Supplemental Consultation

The NMFS 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 NOAA's NMFS. Other interested users could include, the HVT, the Yurok Tribe, and CDFW. The document will be available within 2 weeks at the NOAA Library Institutional Repository (https://repository.library.noaa.gov/welcome). The format and naming adhere to conventional standards for style.

4.2 Integrity

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

4.3 Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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