Environmental Assessment to Analyze Impacts of NOAA’s National Marine Fisheries Service Determination that the Hoopa Valley Tribe’s Tribal Resource Management Plan Meets the Requirements of the Endangered Species Act Tribal 4(d) Rule

Final Environmental Assessment

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National Oceanic and Atmospheric Administration

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This EA is being prepared using the 1978 CEQ NEPA Regulations. NEPA reviews initiated prior to the effective date of the 2020 CEQ regulations may be conducted using the 1978 version of the regulations. The effective date of the 2020 CEQ NEPA Regulations was September 14, 2020. This review began prior to September 14, 2020 and the agency has decided to proceed under the 1978 regulations.
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1. INTRODUCTION

1.1 Background

NOAA’s National Marine Fisheries Service (NMFS) is the lead agency responsible for administering the Endangered Species Act (ESA) as it relates to salmon and steelhead. Actions that may affect listed species are reviewed by NMFS under Section 7, Section 10, or Section 4(d) of the ESA. Actions approved under these sections can be used to limit the application of take prohibitions described in Section 9. 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). Similarly, 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. These 4(d) Rules apply the take prohibitions in Section 9(a)(1) of the ESA to threatened salmon and steelhead and set forth specific circumstances when the prohibitions will not apply, known as 4(d) Limits. With regard to fisheries management described in a Tribal Resource Management Plan (TRMP), NMFS declared in the Tribal 4(d) Rule (50 CFR 223.204) that Section 9 take prohibitions would not apply to activities carried out under a TRMP as long as NMFS has determined that the plan will not appreciably reduce the likelihood of survival and recovery of listed species. NMFS’ determination is a Federal action and requires National Environmental Policy Act (NEPA) analysis. This Environmental Assessment (EA) analyzes the impacts of the NMFS determination on a TRMP prepared by the Hoopa Valley Tribe (HVT).

On May 18, 2021, NMFS received a TRMP and a letter from the HVT requesting formal consultation on the HVT TRMP under the ESA (Hoopa Valley Tribe 2021). 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 under the provisions of the Tribal 4(d) Rule. The objective of the TRMP is to provide 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). As per the Tribal 4(d) Rule, NMFS consulted with the HVT during the development of the TRMP through policy and technical staff level communications. 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.

NMFS analyzed the HVT’s TRMP in a Proposed Evaluation and Pending Determination (PEPD) and a draft EA. The PEPD and a draft EA were posted for public review and comment and a notice of availability was posted in the Federal Register (87 FR 10174; Feb 23, 2022). The comment period was 30 days and NMFS did not receive any comments. NMFS evaluated the effects of the HVT TRMP under Section 7(a)(2) of the ESA and issued a biological opinion concluding that the TRMP activities are not likely to jeopardize SONCC coho salmon (NMFS 2022b).
1.2 Proposed Action

The proposed action is a determination by NMFS as to whether the HVT TRMP meets the requirements of the Tribal 4(d) Rule, including whether the implementation of the TRMP would reduce the likelihood of survival and recovery of the SONCC Coho Salmon ESU.

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) (see Section 1.4 for a description of the project area). 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 retains hatchery-origin (HOR) coho salmon with the goal of releasing natural-origin (NOR) coho salmon unharmed. 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 Section 2.2.

1.3 Purpose and Need

The purpose of the proposed action is to 1) ensure that the HVT’s proposed TRMP complies with the requirement of the ESA Tribal 4(d) Rule, and 2) meet NMFS’ tribal trust responsibilities. Compliance with the Tribal 4(d) Rule will ensure that the activities described in the TRMP would not appreciably reduce the survival and recovery of ESA-listed SONCC coho salmon. The need for the proposed action is to provide for meaningful exercise of tribal fishing rights. The goals and objectives of the HVT TRMP are in Section 2.2 below.

1.4 Project Area

The project area is the geographic area where the activities described in the HVT TRMP will occur. The geographic area of the TRMP is the section of the lower Trinity River (river mile 0.5 to 12) that lies within the boundaries of the HVR (Figure 1).

The Trinity River is the largest tributary to the Klamath River with a drainage area of approximately 2,900 square miles, and joins the Klamath at river mile 44 (Figure 2). The river flows for 172 miles beginning in the Klamath and Coast Ranges, continuing through Trinity and Humboldt Counties, and joining the Klamath River at Weitchpec, California (river mile 43).

All coho salmon within the project area are included in the SONCC Coho Salmon ESU. There are three identified populations in the Trinity River: the Lower Trinity River population, the Upper Trinity River population, and the South Fork Trinity River population (NMFS 2014b).
Figure 1. Map of the Trinity River basin. The Hoopa Valley Reservation boundary is indicated by the dotted square. Location of the Hoopa Valley Tribe’s resistance board weir indicated by a blue X. Map source: (USFWS et al. 2000).
Figure 2. Map depicting the boundary of the Southern Oregon/Northern California Coast Coho Salmon ESU (NMFS 2014b). Dashed rectangle shows the Trinity River area from Figure 1.
1.5 Public Involvement

A notice of availability for the draft EA was published in the Federal Register on February 23, 2022 and the draft EA was available to the public for a 30-day comment period. No comments were received.

2. DESCRIPTION OF ALTERNATIVES INCLUDING PROPOSED ACTION

Two alternatives are evaluated in this EA: (1) No Action (status-quo); NMFS does not issue a determination that the TRMP meets the requirements of the Tribal 4(d) Rule; and (2) Preferred alternative, NMFS issues a determination that the TRMP meets the requirements of the Tribal 4(d) Rule.

A third alternative, a “no fishing” scenario was considered but eliminated from further consideration. Under this alternative HVT would discontinue their fisheries. This alternative would not meet the purpose and need (described above) of the proposed action.

2.1 Alternative 1 (No Action) – NMFS does not issue a determination that the TRMP meets the requirements of the Tribal 4(d) Rule

Under Alternative 1, NMFS would not issue a determination that the TRMP meets the requirements of the Tribal 4(d) Rule. The actions described in the HVT TRMP would not be exempted from ESA Section 9 take prohibitions. NMFS recognizes the possibility that the HVT fisheries may continue regardless of the NMFS determination. NMFS’ ESA review of a TRMP does not itself permit the operation of the described fishery. The HVT have a federally reserved fishing right (Office of the Solicitor 1993). In this circumstance, NMFS’ role is limited to making a determination as to whether the TRMP meets the requirements of the Tribal 4(d) Rule and whether the activities conducted pursuant to the TRMP would be likely to appreciably reduce the survival and recovery of ESA-listed fish.

Under the no action alternative, NMFS assumes the HVT fisheries would continue under current conditions (status-quo). The status quo fisheries are described in Section 2.2.2 (HVT Fisheries) and in Section 3.2.1 (Fisheries). However, under the no action alternative the HVT is not likely to proceed with some of the TRMP provisions such as harvest limits for NOR coho salmon, regular reporting to NMFS, triggers for TRMP re-evaluation, and a comprehensive re-evaluation after three years of implementation. These provisions were agreed to during pre-consultation between NMFS and the HVT and are intended to improve understanding of harvest effects of the tribal fishery on SONCC coho salmon.

2.2 Alternative 2 (Preferred Alternative) – NMFS issues a determination that the TRMP meets the requirements of the Tribal 4(d) Rule

Under this alternative, NMFS would issue a determination that the HVT TRMP meets the requirements of the Tribal 4(d) Rule and, as a result, the activities conducted under the TRMP would be exempted from the take prohibitions in ESA Section 9. In this case, the HVT fisheries and associated monitoring, evaluation, and reporting would be implemented as described in the
HVT TRMP. For this analysis, NMFS assumes the proposed action would result in the level of harvest impacts as described in the HVT TRMP. In addition, NMFS assumes the HVT fisheries managers would implement the provisions of the TRMP to ensure that the effects on ESA-listed SONCC coho salmon are monitored and remain within expectations.

The following subsections in this EA describe the components of the HVT TRMP and include:

1) The objectives of the TRMP
2) Descriptions of the HVT fisheries
3) Monitoring and evaluation of the fisheries
4) Requirements for annual reporting, and
5) Annual review and re-evaluation of the TRMP.

2.2.1 TRMP Objectives

The primary objective of the TRMP is to provide tribal harvest opportunity 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 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>
<thead>
<tr>
<th>Objective or Performance Standard</th>
<th>Performance Indicators</th>
</tr>
</thead>
</table>
| 1. Monitor and evaluate ITMF and HVT weir and limit impacts to ESA protected coho salmon | 1. Number of fish harvested and released  
2. Catch per Unit Effort in the Tribal Member Fishery (ITMF)  
3. Limits for impacts on natural origin return (NOR) coho salmon are established and maintained at the 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. HVT 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 HVT 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 fish 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 HVT weir  
2. Percent hatchery origin spawners in natural production areas  
3. Harvest rate of HOR coho salmon at the weir and in the ITMF  
4. Number of coho salmon taken for broodstock at TRH and offshore 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 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 Coho Salmon ESU) |

2.2.2 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
Historically, HVT fisheries targeted NOR Chinook salmon, coho salmon, and steelhead. However, hatchery origin fish comprise the majority of present-day harvest (e.g., 40 percent of the Chinook salmon and 90 percent of the coho salmon harvested are hatchery 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 (see Description of the Project 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 (Table 1). Estimates of preseason abundance are not currently available for coho salmon and steelhead.

The HVT fisheries consist of the ITMF and the selective harvest weir (weir described below). Under the preferred alternative, the ITMF would continue to operate as it has during recent history (see Figure 3). 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). Effort increases in the fall as net fishers target fall Chinook salmon. Hook-and-line fishing also occurs during this time with most of the effort focused in August and September. Coho salmon are encountered occasionally during fisheries targeting fall Chinook and coho salmon are targeted during their peak migration in October.
Figure 3. Effort (net days) by week in the 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 4. Schematic of a resistance board weir from Stewart (2003).
Table 2. Fishery, gears, targets species, and released fish described in the Hoopa Valley Tribe’s (HVT) Tribal Resource Management Plan.

<table>
<thead>
<tr>
<th>Fishery</th>
<th>Gear</th>
<th>Target Species</th>
<th>Fish Released</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Tribal Member Fishery</td>
<td>Gillnets Hook and line</td>
<td>Chinook salmon Coho salmon Steelhead</td>
<td>None</td>
</tr>
<tr>
<td>HVT Weir</td>
<td>Floating resistance board weir</td>
<td>Chinook salmon HOR Coho salmon HOR steelhead</td>
<td>NOR coho salmon NOR steelhead</td>
</tr>
</tbody>
</table>

The HVT has recently deployed a weir to selectively harvest HOR coho salmon. The objective of the weir is to remove surplus HOR coho salmon, which aligns with the objectives of 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 selective harvest weir was installed for the first time in 2016 and operated in 2017, 2018, and 2019. The weir is a floating resistance board type and is installed in the river near the southern boundary of the HVR (Figure 1). 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. The proposed action includes operating the selective harvest weir during the entire coho salmon migration from September through November with a trapping season of 11 weeks. The weir has not been deployed for the full 11 weeks in any of the previous years due to logistics and/or flow conditions. The target species are Chinook salmon and HOR coho salmon. HOR steelhead may also be retained. All NOR coho salmon and steelhead would be released upstream of the weir to continue their migration. 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 between the hours of 1700–0900.

### 2.2.3 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 estimate the number of fish harvested and released, species composition, and the origin (i.e., HOR and NOR) of fish harvested. 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 carefully releasing non-target fish above the weir. If water temperatures exceed 70\(^\circ\) F, trapping operations will be suspended and the weir will be left open.

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\(^1\) 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.
If water 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 completely removed.

The TRMP considers ancillary effects of the weir on fish migration, includes plans for monitoring these effects, and 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 by causing them to avoid the weir structure (rejection). To monitor for delay and rejection, daily monitoring of the ITMF directly below the weir 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 delay or rejection of NOR coho salmon is observed, mitigation efforts include removal of weir panels to increase potential navigation pathways through the weir structure.

2.2.4 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 salmon are retained in the ITMF and released in the weir fishery. When fish are released, a small proportion will eventually die because of 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 common metric allows the total fishery related mortality to be accounted for.

\[ HVT \ ITMF \]

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

The ITMF HR on NOR coho salmon is expected to be similar to the historical harvest with any consecutive three-year rolling average not exceeding 5.0 percent.

**HVT Weir**

The mortalities of NOR coho salmon resulting from the weir fishery is represented as an HR where:

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

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 on NOR coho salmon is expected to be similar to this with a consecutive three-year rolling average not exceeding 0.45 percent.

Combined, the ITMF and weir fisheries are expected to align with the historical averages. Thus, the preferred alternative would result in a HR not to exceed a three-year rolling average of 5.45 percent. In Section 3.2.1 below, the TRMP harvest is described in context of regional fisheries.

**2.2.5 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

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

### 2.2.6 Annual Review and Re-Evaluation of the TRMP

Under the provisions of the TRMP, the HVT would conduct an annual review of the implementation of the TRMP. The basis for the evaluation would be to compare the objectives and performance standards, including expected HRs, with the annual results of the HVT fisheries and associated monitoring. The results of the annual review would be described in the post-season annual report to NMFS.

After three years, NMFS and HVT would re-evaluate the performance of the TRMP. The re-evaluation will consider the performance of the TRMP using the performance standards and indicators and, specifically, will compare the HRs from the ITMF and weir to the expected HRs described in the TRMP.

The TRMP also identifies several triggers that would lead to re-evaluation of the TRMP by NMFS and HVT. The re-evaluation triggers include:

- 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 upon ESA protected species that was not previously considered in 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.

### 3. AFFECTED ENVIRONMENT

This chapter describes current conditions for the resources that may be affected by the alternatives described in this EA. The alternatives identified above can potentially affect the physical, biological, socioeconomic, cultural, and health related resources within the project area. The resources considered in this EA are:

- Water quality (Subsection 3.1)
- Salmon and steelhead (Subsection 3.2)
- Other Fish Species (Subsection 3.3)
- Environmental justice (Subsection 3.4)
- Cultural resources (Subsection 3.5)

No other resources were identified during internal scoping that would potentially be impacted by the proposed action. Some resources were considered for analysis and were not included in this
document, as they were not impacted by the action. Those resources include: wildlife species; listed plants and general vegetation; invasive species; geology and soils; water quantity, groundwater, and hydrology; air quality; aesthetics, light, and glare; agriculture; transportation; land use and ownership; tourism and recreation; socioeconomics; public services; and human health and safety.

3.1 Water Quality

Water quality in the Trinity River is diminished by excessive sediment, high water temperatures, and excess nutrients. The Trinity River is listed as impaired under Section 303(d) of the Clean Water Act because of sediment loading (EPA 2001). The North Coast Regional Water Quality Control Board identified several water quality issues in the Trinity River watershed including sedimentation of streams, high water temperatures, and mercury contamination in fish (RWQCB 2005). Mainstem and tributary water is impaired by high summer temperatures and water temperature in the Upper Trinity River is highly dependent on dam operations and releases. Large algae blooms occur in the Trinity River as a result of high levels of nutrients (nitrogen and phosphorous) in runoff from livestock and agricultural operations (NMFS 2014b).

3.2 Salmon and Steelhead

Populations of salmon and steelhead in the Trinity River basin have been severely impacted due to a variety of land use and anthropogenic activities in the region. Mining, timber harvesting, hatchery effects, 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 inputs, poor riparian conditions, sediment accretion, and the number of deep pools in the river has decreased. Sedimentation, channelization, and channel confinement have also increased within the Trinity River, while flows are often too low to create optimal water temperatures for salmonids (U.S. Department of the Interior 2000; NMFS 2014b).

Since 1999, NMFS has identified three salmon ESUs in the project area: SONCC coho salmon, SONCC Chinook salmon, and Upper Klamath and Trinity River Chinook salmon. Additionally, the Klamath Mountains Province distinct population segment (DPS) of steelhead is present in the project area. Only SONCC coho salmon are listed under the ESA.

Run-size estimates of adult steelhead, Chinook salmon, and coho salmon in the Trinity River are:

- **Steelhead:** The average run-size of fall steelhead is estimated at 14,225 fish for years 1980 through 2018 (CDFW 2019).
- **Winter-run steelhead estimates are not available.**
• Fall-run Chinook salmon: The average run-size of fall-run Chinook salmon is estimated at 40,854 for years 1977 through 2018 (CDFW 2019).
• Spring-run Chinook salmon: The average run-size of spring-run Chinook salmon is estimated at 15,882 fish for years 1978 through 2018 (CDFW 2019).
• Coho salmon: The average run-size of coho salmon is estimated at 15,633 fish for years 1977 through 2018 (CDFW 2019).

3.2.1 Fisheries

Fisheries targeting or retaining coho salmon are prohibited in non-tribal fisheries in California (PFMC 2021). SONCC coho salmon are rarely encountered in non-tribal freshwater fisheries and are only caught incidentally in fisheries targeting Chinook salmon and steelhead in California and Oregon (NMFS 2014b; Williams et al. 2016).

Tribal fisheries in the Klamath and Trinity basins affect SONCC coho salmon through direct harvest and incidental mortalities in fisheries targeting other species. The HVT fisheries are described above as part of the proposed action. The Yurok Tribe fisheries occur in the Klamath River and in a small section of the Trinity River, downstream of the HVR. The Yurok Tribe uses gill nets to harvest Chinook salmon and coho salmon. The HVT and the Yurok Tribe have each enacted fishing ordinances for their tribal members, which outline their regulations for salmon fishing in the mainstem of the Trinity and Klamath rivers (Hoopa Valley Tribe 1986; The Yurok Tribe 2021). Estimated harvest of Chinook salmon in tribal fisheries in the Trinity River averaged 4,011 during 2010 to 2019 (Table 3). Harvest of coho salmon is described below.

Table 3. Estimated harvest of Chinook salmon in tribal fisheries in the Trinity River. Numbers are adult fish.

<table>
<thead>
<tr>
<th>Year</th>
<th>Spring Run</th>
<th>Fall-Run</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1,740</td>
<td>3,701</td>
<td>5,441</td>
</tr>
<tr>
<td>2011</td>
<td>2,282</td>
<td>4,863</td>
<td>7,145</td>
</tr>
<tr>
<td>2012</td>
<td>2,647</td>
<td>4,145</td>
<td>6,792</td>
</tr>
<tr>
<td>2013</td>
<td>1,202</td>
<td>3,019</td>
<td>4,221</td>
</tr>
<tr>
<td>2014</td>
<td>1,733</td>
<td>2,440</td>
<td>4,173</td>
</tr>
<tr>
<td>2015</td>
<td>1,087</td>
<td>2,040</td>
<td>3,127</td>
</tr>
<tr>
<td>2016</td>
<td>679</td>
<td>751</td>
<td>1,430</td>
</tr>
<tr>
<td>2017</td>
<td>412</td>
<td>1,660</td>
<td>2,072</td>
</tr>
<tr>
<td>2018</td>
<td>481</td>
<td>2,325</td>
<td>2,806</td>
</tr>
<tr>
<td>2019</td>
<td>838</td>
<td>2,065</td>
<td>2,903</td>
</tr>
</tbody>
</table>

Ocean salmon fisheries are managed under the Magnuson-Stevens Fishery Conservation and Management Act (MSA)(16 U.S.C. §§1801 et seq.), which requires that NMFS determine that fishery actions meet the requirements of the MSA and other applicable law, including the ESA. The PFMC manages the ocean salmon fisheries through the Pacific Coast Salmon Fishery Management Plan (FMP). The FMP requires that the PFMC manage ocean salmon fisheries
consistent with NMFS’ ESA consultations or recovery plans to meet the immediate needs for conservation and long-term recovery of the species. Consistent with the requirements of the FMP, NMFS provides guidance to the PFMC regarding ESA-related management constraints derived from existing opinions through an annual guidance letter (see for example Thom (2021)). Specific to the SONCC Coho Salmon ESU, NMFS evaluated the impact of the ocean salmon fisheries in a biological opinion completed by NMFS in 2022. The biological opinion considered the impacts of a PFMC harvest framework establishing maximum limits on the allowable exploitation rate (ER) for SONCC coho salmon (NMFS 2022a). The ER limits are 16% for the Trinity River populations and 15% for all other populations of the SONCC Coho Salmon ESU and these limits account for harvest in salmon fisheries in the ocean and in freshwater. In assessing the impact of the freshwater fisheries, NMFS (2022a) used the same harvest information provided in the HVT TRMP. Thus, the impact of the TRMP fisheries are accounted for in the PFMC harvest framework which limits overall impacts on the SONCC Coho Salmon ESU. NMFS determined that this harvest framework, including the ER limits, would not jeopardize the SONCC Coho Salmon ESU.

A SONCC Harvest Control Rule Risk Assessment (RA) was recently completed by the PFMC (PFMC 2021). The RA evaluated the risk to the SONCC Coho Salmon ESU from harvest in marine and freshwater environments. The RA quantified the effect of all fisheries as an ER. An ER is the amount of mortality of a fishery relative to the total coast-wide abundance of a species or population. The RA used the estimated ocean abundance of adult NOR coho salmon, originating from the Trinity River, as the denominator. Harvest information (expressed as an ER) for the Trinity populations of SONCC coho salmon is summarized in Table 4 below. For years 2001 to 2019 (excluding 2018), the ER for the HVT fisheries averaged 2.8 percent. The RA specifically modeled the effects of fixed ERs on the short- and long-term risk of falling below critical NOR abundance thresholds (Figure 5). This information allows us to assess the relative risk to Trinity River coho salmon populations from the HVT fisheries that have occurred in recent history. Compared to a zero-fishing scenario, the effect of the HVT fisheries (average ER 2.8 percent) on the short-term risk to Trinity River coho salmon has been less than 5 percent (Figure 5).
Table 4. Exploitation rates for Southern Oregon/Northern California Coast coho salmon originating from the Trinity River caught in ocean, tribal, and freshwater recreational fisheries (PFMC 2021).

<table>
<thead>
<tr>
<th>Year</th>
<th>Ocean fisheries</th>
<th>Yurok Tribe fisheries</th>
<th>Hoopa Valley Tribe fisheries</th>
<th>Klamath River Recreational fisheries</th>
<th>Trinity River Recreational fisheries</th>
<th>Total ER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>1.6%</td>
<td>1.9%</td>
<td>5.2%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>8.7%</td>
</tr>
<tr>
<td>1998</td>
<td>11.5%</td>
<td>2.5%</td>
<td>4.5%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>18.5%</td>
</tr>
<tr>
<td>1999</td>
<td>10.3%</td>
<td>6.4%</td>
<td>5.5%</td>
<td>0.1%</td>
<td>0.0%</td>
<td>22.3%</td>
</tr>
<tr>
<td>2000</td>
<td>2.0%</td>
<td>4.4%</td>
<td>5.0%</td>
<td>0.2%</td>
<td>0.0%</td>
<td>11.7%</td>
</tr>
<tr>
<td>2001</td>
<td>2.4%</td>
<td>12.9%</td>
<td>2.8%</td>
<td>0.3%</td>
<td>0.0%</td>
<td>18.4%</td>
</tr>
<tr>
<td>2002</td>
<td>5.2%</td>
<td>11.0%</td>
<td>3.6%</td>
<td>0.9%</td>
<td>0.0%</td>
<td>20.7%</td>
</tr>
<tr>
<td>2003</td>
<td>8.1%</td>
<td>1.5%</td>
<td>0.4%</td>
<td>0.1%</td>
<td>0.0%</td>
<td>10.1%</td>
</tr>
<tr>
<td>2004</td>
<td>7.9%</td>
<td>4.4%</td>
<td>0.9%</td>
<td>0.1%</td>
<td>0.0%</td>
<td>13.3%</td>
</tr>
<tr>
<td>2005</td>
<td>5.3%</td>
<td>4.5%</td>
<td>0.7%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>10.5%</td>
</tr>
<tr>
<td>2006</td>
<td>5.6%</td>
<td>6.7%</td>
<td>1.9%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>14.2%</td>
</tr>
<tr>
<td>2007</td>
<td>10.1%</td>
<td>2.4%</td>
<td>1.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>13.5%</td>
</tr>
<tr>
<td>2008</td>
<td>1.1%</td>
<td>9.8%</td>
<td>4.2%</td>
<td>0.4%</td>
<td>0.0%</td>
<td>15.6%</td>
</tr>
<tr>
<td>2009</td>
<td>1.5%</td>
<td>7.9%</td>
<td>4.1%</td>
<td>1.0%</td>
<td>0.0%</td>
<td>14.5%</td>
</tr>
<tr>
<td>2010</td>
<td>1.7%</td>
<td>6.7%</td>
<td>6.4%</td>
<td>0.5%</td>
<td>0.0%</td>
<td>15.3%</td>
</tr>
<tr>
<td>2011</td>
<td>3.1%</td>
<td>6.1%</td>
<td>1.6%</td>
<td>0.6%</td>
<td>0.0%</td>
<td>11.4%</td>
</tr>
<tr>
<td>2012</td>
<td>10.1%</td>
<td>5.1%</td>
<td>0.3%</td>
<td>0.6%</td>
<td>0.0%</td>
<td>16.1%</td>
</tr>
<tr>
<td>2013</td>
<td>10.6%</td>
<td>10.1%</td>
<td>2.6%</td>
<td>0.4%</td>
<td>0.0%</td>
<td>23.7%</td>
</tr>
<tr>
<td>2014</td>
<td>4.3%</td>
<td>0.8%</td>
<td>5.0%</td>
<td>2.7%</td>
<td>0.0%</td>
<td>12.8%</td>
</tr>
<tr>
<td>2015</td>
<td>11.0%</td>
<td>8.4%</td>
<td>5.5%</td>
<td>0.3%</td>
<td>0.0%</td>
<td>25.3%</td>
</tr>
<tr>
<td>2016</td>
<td>4.8%</td>
<td>5.4%</td>
<td>1.6%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>11.9%</td>
</tr>
<tr>
<td>2017</td>
<td>3.3%</td>
<td>0.3%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>3.6%</td>
</tr>
<tr>
<td>2018*</td>
<td>3.0%</td>
<td>6.7%</td>
<td>37.9%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>47.7%</td>
</tr>
<tr>
<td>2019</td>
<td>3.3%</td>
<td>3.9%</td>
<td>8.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>15.2%</td>
</tr>
</tbody>
</table>

* The 2018 is considered an outlier due high uncertainty in abundance estimates (Hoopa Valley Tribe 2021; PFMC 2021).
Figure 5. Modeled effects of fixed exploitation rates on the risk of falling below critical wild population abundance thresholds (PFMC 2021).

### 3.3 Other Fish Species

SONCC coho salmon are the only ESA-listed fish in the project area. Trinity River SONCC coho salmon may be prey, predators, or competitors for food and space with, or for, other fish species in the Trinity River, Klamath River, and nearshore marine areas (Table 5). The prey, predator, and competitive behaviors depend on the relative life stages and the spatial and temporal overlap of coho salmon with other fish species. There are also several non-native fish species including brown bullhead, brown trout, channel catfish, largemouth bass, crappie, and bluegills that may overlap with the distribution of Trinity River coho salmon. The non-native fish are primarily competitors with, and predators on, Trinity River coho salmon (Alvarez 2017).
Table 5. Range and status of other (non-salmonid) native fish species that may interact with Trinity River coho salmon (NMFS 2020).

<table>
<thead>
<tr>
<th>Species</th>
<th>Federal/State Listing Status</th>
<th>Type of Interaction with Salmon and Steelhead</th>
</tr>
</thead>
</table>
| Pacific lamprey *Entosphenus tridentatus* | CDFW – Species of Special Concern CDF – Sensitive | • Potential prey item for adult salmonids  
• May compete with salmonids for food and space  
• May be a parasite on salmonids while in marinewaters  
• May benefit from marine-derived nutrients provided by salmonids |
| River lamprey *Lampetra ayresii* |                                                            |                                                                                  |
| Eulachon *Thaleichthys pacificus* | Southern DPS – Federally listed as threatened | • Potential prey item for juvenile salmonids |
| Green sturgeon *Acipenser medirostris* | Southern DPS – Federally listed as threatened CDFW – Species of Special Concern | • May compete with salmonids for food  
• May benefit from marine-derived nutrients provided by salmonids |
| White sturgeon *Acipenser transmontanus* | CDFW – Species of Special Concern | • May compete with salmonids for food  
• May benefit from marine-derived nutrients provided by salmonids |
| Other predatory fish (e.g., rockfish, halibut, and sharks) | Several species are federally listed as threatened and/or have State Candidate listing status | • Predators of juvenile salmonids  
• Juveniles are prey for salmonids  
• May compete with salmonids for food |

3.4 Environmental Justice

Potential environmental justice impacts are evaluated for an area if the effects are likely to disproportionately affect minority or low-income populations (Executive Order 12898; 59 FR 7629). In this case, the percentage of minority, per capita income, and percentage of low-income persons are markedly greater than the percentage of minority, per capita income, and percentage low-income persons in California and so the potential environmental justice impact were analyzed. While the proportion of Trinity County’s overall minority population is less than the proportion of California’s minority population, Trinity County’s American Indian population is 3 times greater than California’s American Indian population (Table 6), by proportion. Therefore, Trinity County may be considered an environmental justice community of concern for American Indians, but not for all minority populations. Additionally, Trinity County’s low-income population meaningfully exceeds the low-income population of the State of California and will also be considered in this assessment (Table 6).
Table 6. Trinity County and California population levels, minority populations percentages, annual income, and percentage of persons living below poverty level (i.e., low income population) (United States Census Data 2019\(^3\)).

<table>
<thead>
<tr>
<th>Population</th>
<th>Trinity County</th>
<th>State of California</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black or African American (2019)</td>
<td>0.8%</td>
<td>6.5%</td>
</tr>
<tr>
<td>American Indian/Alaskan Native (2019)</td>
<td>5.2%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Asian (2019)</td>
<td>1.5%</td>
<td>15.5%</td>
</tr>
<tr>
<td>Native Hawaiian and Other Pacific Islander (2019)</td>
<td>0.2%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Hispanic or Latino (2019)</td>
<td>7.4%</td>
<td>39.4%</td>
</tr>
<tr>
<td>Median Household Income (2019)</td>
<td>$40,846</td>
<td>$75,235</td>
</tr>
<tr>
<td>Poverty Rate (2019)</td>
<td>16.5%</td>
<td>11.8%</td>
</tr>
</tbody>
</table>

### 3.5 Cultural Resources

Salmon are a core symbol of tribal identity, individual identity, and the ability of the tribes to endure (NWIFC 2013). The survival and well-being of salmon is seen as inextricably linked to the survival and well-being of American Indians and the cultures of the tribes.

The U.S. government has a trust or special relationship with Indian tribes. The unique and distinctive political relationship between the U.S. and Indian tribes is defined by statutes, executive orders, judicial decisions, and agreements and differentiates tribes from other entities that deal with, or are affected by the Federal government. Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, states that the U.S. has recognized Indian tribes as domestic dependent nations under its protection. Secretarial Order 3206 (American Indian Tribal Rights, Federal Tribal Trust Responsibilities, and the ESA) clarifies the responsibilities of the Departments Commerce and Interior when actions taken under the ESA affect Indian lands, tribal trust resources, or American Indian tribal rights. The trust responsibility has been interpreted to require Federal agencies to carry out their activities in a manner that is protective of Indian treaty rights (DOC 2013).

The Yurok and Hoopa (Hupa) native peoples occupied the Trinity River watershed before Euro-American settlement. The Klamath and Trinity rivers are, and have always been, essential to the livelihood of the tribes. The Yurok Tribe’s ancestral territories are described with a western boundary along the Pacific Ocean, encompassing Trinidad Head and the coast down to Little River, inland toward Rodgers Peak, east to Weitchpec, and north to the beaches south of Crescent City. The Hoopa tribal lands are east of the Trinity River, with western and southern boundaries at the river, and a northern boundary shared with the Yurok (near Weitchpec). Salmon fishing has been a focus for tribal economies, lifestyles, and identities for thousands of years. These activities continue to be central to tribal culture for subsistence and ceremonial purposes.

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\(^3\) https://www.census.gov/quickfacts/fact/table/trinitycountycalifornia,CA/PST045219
4. ENVIRONMENTAL CONSEQUENCES

In Section 4, Environmental Consequences, the potential direct and indirect effects of the two alternatives are evaluated on the biological, physical, and socioeconomic resources described in Section 3 (Affected Environment).

Under Alternative 1, NMFS would not issue a determination that the TRMP meets the requirements of the Tribal 4(d) Rule, and the activities conducted under the TRMP would not be exempted from Section 9 take prohibitions. Alternative 1 serves as a baseline for environmental condition for comparison purposes to the proposed action (Alternative 2). Under Alternative 1, we assume that the harvest activities would continue at existing levels and the effects of the existing activities would remain the same as the current conditions.

4.1 Alternative 1 – No Action Alternative

4.1.1 Water Quality

Under Alternative 1, NMFS would not issue a determination on the TRMP under the Tribal 4(d) Rule. As a result, the Trinity River water and groundwater quantity and quality would likely receive an undetectable effect compared to the existing conditions. This alternative would not be expected to change the 303(d) listings for total sediment load and turbidity/suspended sediment load. Therefore, the impacts of Alternative 1 on Water Quality would not be significant.

4.1.2 Salmon and Steelhead

Under Alternative 1, we assume harvest would continue at existing levels and the effects of the existing fisheries would remain the same as the current conditions. The relative impacts on salmon and steelhead would remain the same as the status quo (described in 3.2.1 above) on average. HVT fishing for Chinook salmon, coho salmon, and steelhead would still occur at similar rates to those under current conditions. Therefore, the impacts of Alternative 1 on salmon and steelhead would not be significant.

4.1.3 Other Fish Species

Under Alternative 1, the level of competition for space and food among freshwater species would be maintained relative to current conditions during the short and long-term. Under this alternative HVT tribal fishing would still occur at similar rates to those under current conditions. Therefore, the impacts of Alternative 1 on other fish species would not be significant.

4.1.4 Environmental Justice

Trinity County is not an environmental justice community of concern for minorities as defined by Executive Order 12898 (59 FR 7629, February 16, 1994) and Title VI of the Civil Rights Act of 1964 (Subsection 3.6, Environmental Justice and Cultural Resources). Specifically, the total number of minorities in Trinity County is not meaningfully greater than in the State of California overall. However, 5.2 percent of the Trinity County population is American Indian, which is three times higher than the California state average (Table 6). Therefore, NMFS considers
Trinity County is an environmental justice community of concern for American Indians. Any reduction in harvest opportunity poses a disproportionate effect on tribes because of the unique connection of American Indian tribes to salmon.

Trinity County is an environmental justice community of concern for the low-income population (i.e., persons living below the poverty line) because this population is 16.5 percent of the County’s population compared to 11.8 percent of California’s population (Table 6).

Under Alternative 1, NMFS would not issue a determination of whether the TRMP meets the requirements of the Tribal 4(d) Rule and, therefore, the fishing opportunities for the HVT tribal community would not be exempted from take prohibitions under Section 9 of the ESA. However, no significant effects would be expected overall for the tribes that fish the Trinity River because we assume fisheries would continue as described under current conditions. Therefore, the impacts of Alternative 1 on environmental justice would not be significant.

4.1.5 Cultural Resources

Under Alternative 1, all activities would continue as described for the Affected Environment. The existence of the status quo fisheries contributes to the cultural integrity and well-being of the tribes. The maintenance of natural resource practices for HVT would not result in significant effects on tribal cultural resources. Therefore, the impacts of Alternative 1 on Cultural Resources would not be significant.

4.2 Alternative 2- Proposed Action

4.2.1 Water Quality

Under Alternative 2, NMFS would issue a determination that the TRMP meets the requirements of the Tribal 4(d) Rule and the activities conducted under the TRMP would be exempted from the take prohibitions under Section 9 of the ESA. Under Alternative 2, the Trinity River water and groundwater quantity and quality would receive an undetectable effect compared to the existing conditions. This alternative would not be expected to change the 303(d) listings for total sediment load and turbidity/suspended sediment load. Therefore, the impacts of Alternative 2 on Water Quality would not be significant.

4.2.2 Salmon and Steelhead

Under Alternative 2, harvest of SONCC coho salmon in the HVT fisheries would be exempted from Section 9 take prohibitions under the ESA. In the ITMF, impacts on NOR coho salmon are expected to align with historical (2001-2019) harvest rates, but would now adhere with a three-year rolling average not to exceed a 5.0 percent HR on NOR coho salmon. The weir fishery is expected to result in impacts similar to the harvest rates occurring from 2016 to 2019. During 2016 to 2019, the average harvest rate on NOR coho salmon was 0.45 percent. Therefore, the expectation is that the weir harvest rates would not exceed a three-year rolling average of 0.45 percent on NOR SONCC coho salmon. The objective for the weir is to harvest HOR coho salmon while passing NOR coho salmon upstream. Regular openings of the weir allow for only a
small proportion of the run to be handled, and sufficient hatchery coho salmon are expected to escape to the Trinity River Hatchery to achieve program needs.

Under the proposed action, HVT fishing for Chinook salmon, coho salmon, and steelhead would occur at rates similar to recent history (Table 3 and Table 4). The relative impacts on salmon and steelhead would remain near the same as the status quo (described in Section 3.2) on average. However, harvest on NOR coho salmon but would now adhere to three-year rolling average not to exceed a 5.45 percent HR on NOR coho salmon. The extinction risk of Trinity coho salmon populations is high even in the absence of fisheries because of low abundance and productivity. The ER equivalent of the proposed action is 2.8 percent which equates to a low increase in risk to Trinity River Coho salmon over a 20-year period (<5%) when compared to a zero-fishing scenario (Figure 5). Therefore, the impacts of Alternative 2 on Salmon and Steelhead would not be significant.

4.2.3 Other Fish Species

Under Alternative 2, the level of competition for space and food among freshwater species would be maintained relative to current conditions during the short and long-term. This alternative would not be expected to have significant adverse effects on other fish species compared to current conditions, as HVT tribal fishing would still occur at similar rates to those under current conditions. Therefore, the impacts of Alternative 2 on Other Fish Species would not be significant.

4.2.4 Environmental Justice

Trinity County is an environmental justice community of concern for American Indians and people living below poverty because their numbers meaningfully exceed the same sub-populations in California (Table 6). Alternative 2 would not have significant adverse effects for the tribes that fish the Trinity River because fisheries would continue as described under current conditions. Therefore, the impacts of Alternative 2 on Environmental Justice would not be significant.

4.2.5 Cultural Resources

Under Alternative 2, the HVT would harvest salmon and steelhead in a manner similar to current conditions. Other American Indian communities would have unchanged opportunities to fish for returning Trinity River coho salmon adults. Since Alternative 2, represents continued harvest opportunity for the HVT similar to current conditions, and would not affect other tribal fisheries, it would not result in significant adverse impacts.

The existence of the status quo fisheries contributes to the cultural integrity and well-being of the tribes. The maintenance of natural resource practices for HVT would not result in significant effects on tribal cultural resources. Therefore, the impacts of alternative 2 on Cultural Resources would not be significant.
5. CUMULATIVE EFFECTS

5.1 Introduction

NEPA defines cumulative effects as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions” (40 C.F.R.1508.7).

CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action from every conceivable perspective, but rather, the intent is to focus on those effects that are truly meaningful (Council on Environmental Quality 1997). In other words, if several separate actions have been taken or are intended to be taken within the same geographic area, all of the relevant actions together (cumulatively) need to be reviewed, to determine whether the actions together could have a significant impact on the human environment. Past, present, and reasonably foreseeable future actions include those that are Federal and non-Federal.

5.2 Geographic and Temporal Scales

The cumulative effects assessment area is the entire project area (Figure 2). All potentially affected resources will be assessed using the Trinity River Watershed area. The scope of the proposed action considered here includes the capture of NOR and HOR SONCC coho salmon in the Trinity River. The direct, indirect, and cumulative reviews address potential effects in the entire project area, although adult harvest would occur in localized areas only as discussed in earlier sections.

5.3 Past and Present Actions

NMFS recognizes that all past actions in the Trinity River watershed resulted in substantially altered watershed conditions (USFWS and Hoopa Valley Tribe 1999), degraded habitats (NMFS 2014b), and reduced wildlife and fish populations (NMFS 2014b). These cumulative effects have led to coho salmon population declines, even with supplemental hatchery operations. This conclusion is strongly supported in literature (Kier et al. 2016), studies on sediment budgets and erosion and transport (EPA 2001; Graham Matthews & Associates 2014), wildlife listings, the SONCC coho salmon ESA listing, and the California and SONCC coho salmon recovery plans (CDFG 2004; NMFS 2014b).

Negative watershed and in-river effects seem to have peaked during the 1950s to 1980s when the highest rates of landscape extraction activities (e.g., timber harvesting and gravel mining) occurred in conjunction with a wetter climate period that produced several of the largest floods on record (e.g., 1955, 1964, and 1975). Wildlife and fish populations were already declining from harvest and degraded habitats, but the continued loss of habitat continued to suppress populations, with some species reaching critically low or depensation levels (e.g., coho salmon).
Major human-driven actions are best defined by the magnitude, duration, frequency, and timing of the action or in some cases the environmental response to the actions (e.g., larger floods and sediment erosion).

There are five major categories of past and present actions that were determined to substantially affect the environment in the project Area. These categories were determined to be resource extraction, Trinity River water management, ocean fish harvest, fire management, and watershed and aquatic rehabilitation and management efforts. These action categories will be discussed in context with Alternative 1 and Alternative 2.

5.3.1 Resource Extraction Actions

Resource extraction actions have affected numerous aspects of the environment and provided wood, gravel, water, and salmon and steelhead for human use. Timber harvest, road systems, hydraulic mining, dredging, and other similar land disturbances within the Trinity River watershed have decreased large wood sources, juvenile fish recruitment, and in-channel large wood; altered riparian corridors; altered hydrologic pathways; decreased soil productivity; increased surface erosion and landslides, and the quantities of sediment entering and transporting down river (Graham Matthews & Associates 2014). Although timber harvest and road management practices have improved in recent decades with changes in regulations and reductions in older trees, the major legacy effects have left lasting impacts, and as in any managed watershed, elevated and prolonged suspended sediment and turbidity during runoff events. As discussed in Subsection 3.1 Water Quality, the EPA established a TMDL for addressing sediment/turbidity and temperature exceedances. The TMDL used the Basin Plan and NPDES permit to limit the TRH effluent discharges, ensuring that actions within the watershed would not exceed water quality standards that support beneficial uses.

Large-scale marijuana cultivation occurs throughout the Trinity River Watershed, and diverts water from the Trinity River and its tributaries, dumps chemicals and waste into the environment, damages stream channels (e.g., streambank and channel alterations), and disturbs soil and forest resources (NMFS and USFWS 2013; Bauer et al. 2015). Some cultivation sites are permitted by the state and county, and others are unpermitted. Marijuana is a high water-use plant, and its cultivation reduces stream flows, increases chemical pollution, and potentially increases stream temperatures (Bauer et al. 2015). Many species listed in Table 5 are adversely affected by chemical pollution from these cultivation sites.

5.3.2 Trinity River Water Management

Before 1957, Trinity River water was used by the people who lived nearby. For thousands of years, the river was a source of food and life for the indigenous peoples in the Trinity River watershed. After the arrival of Europeans in the late 19th century, the river was heavily diverted and dredged for mining, forestry, and other extraction efforts. However, more water was needed to sustain the booming populations in central and southern California, so the Trinity River Division of the Central Valley Project began.
Between 1957 and 2000, 70 to 90 percent of Trinity River water was redirected to the Central Valley, which led to sediment fill in the Trinity River Basin. High river flows are necessary to “flush” the riverbed, and these high flows directly support healthy salmon populations (USFWS and Hoopa Valley Tribe 1999). In 2000, the Trinity River Restoration Program was charged with recommending how and when flow releases occur from Lewiston Dam. Now, water releases are scheduled according to reservoir status and rainfall, and at least 50 percent of the Trinity River water is kept within the river. The Bureau of Reclamation (BOR; within the U.S. Department of Interior) makes the final decisions on each year’s flow releases.

Concerns remain about appropriate flow conditions for restoring the Trinity River as a healthy ecosystem. Water temperature and quality, sediment transport, and gravel size are dependent upon the timing and volume of water that is released from the upstream dams (NMFS 2014b). Dams and diversions are also usually barriers to fish passage, blocking habitat and spawning grounds (e.g., 47 percent of the Upper Trinity River) (NMFS 2014b; Asarian 2015).

Downstream of the Trinity River’s confluence with the Klamath River, low water flows in the Klamath cause annual toxic algal blooms, elevate late summer and fall water temperatures (during coho salmon adult migrations), and restrict fish passage (U.S. Department of the Interior and CDFG 2012; NMFS and USFWS 2013). The four lower dams in the Klamath River are scheduled for removal at some point in the near future. Although short-term adverse effects of sedimentation and water quality are expected immediately following dam removal, conditions are expected to significantly improve in less than two years after dam removal (U.S. Department of the Interior and CDFG 2012).

5.3.3 Salmon and Steelhead

5.3.3.1 Harvest

Chinook salmon and steelhead from the Trinity River are harvested in the Pacific Ocean offshore and in-river during specified seasons. The effects of salmon fisheries are managed through cooperation by NMFS, the PFMC, the tribes, and California Department of Fish and Wildlife (CDFW), which all work together to promote sustainable fisheries. The management jurisdictions and coordination are described above in Section 3.2.1. NMFS, the tribes, and CDFW have a complex system of data collection and monitoring to maintain sustainable and viable salmon and steelhead fisheries.

Non-tribal commercial and recreational harvest of coho salmon is limited in California and Southern Oregon, due to the complete harvest closure in 1996 (Subsection 3.2.1, Fisheries). The California Fish and Game Commission (Commission) has adopted a recovery strategy for the SONCC Coho Salmon ESU, with a primary goal of returning coho salmon populations to “a level of sustained viability while protecting [their] genetic integrity” and eventually de-listing the species under the California Endangered Species Act (CDFW 2015). Sustainable harvest by tribal, recreational, and commercial fisheries is an additional, eventual goal.
5.3.3.2 Hatcheries

The TRH is located at the base of Lewiston Dam in Trinity County (Figure 1). Artificial propagation on the Trinity River began in 1958, and has continued at the permanent TRH facility since 1963 to mitigate for 109 miles of habitat lost above Lewiston Dam. The initial broodstock used for propagating coho salmon originated from native fish stocks in the Eel, Cascade, Alsea, and Noyo rivers. Since 1971, only Trinity River fish returning to the hatchery have been used for breeding purposes (California HSRG 2012; U.S. Department of the Interior and CDFG 2012). HOR coho salmon released from the TRH are considered part of the SONCC Coho Salmon ESU.

Hatcheries can pose a significant threat to SONCC coho salmon. Hatchery fish can affect NOR salmon populations 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). A HGMP was completed (and approved under a 4(d) limit 5 determination) for the TRH, which aimed to reduce the ecological and genetic impacts of coho salmon produced there (NMFS 2020).

5.3.4 Fire Management Actions

The State of California, Federal agencies, and private landowners implement a range of fire management actions ranging from total suppression to an integrated approach using prescribed fire, fuels treatments, and wildfire emergency response (e.g., suppression). In general, fire management actions consist of vegetation and ground disturbance that can reduce ground cover, and increase water runoff and sediment erosion. These results also increase suspended sediment and turbidity levels in the Trinity River. Changes in water quantity and quality may interact with TRH withdrawals or effluent discharges. The state and Federal agencies have numerous best management practices and post-fire rehabilitation efforts to reduce ground disturbances and sediment erosion.

Burned areas are more susceptible to sediment erosion than unburned areas, and can induce pulses of sediment that can affect fish survival by increasing the magnitude and duration of suspended sediment and turbidity events leading to increased severity of ill effects (Newcombe and Jensen 1996). Fire suppression efforts and climate change have increased the likelihood of larger fires and thus, sediment runoff pulses within the Trinity River watershed. Many factors (e.g., drought and fire suppression efforts) helped create recent fires within the Trinity River watershed. These fires and recently proposed post-fire actions (e.g., hazard tree, fuels reduction treatments, and salvage logging) will likely increase sediment runoff. Fire severity and risk are expected to increase with future climate change (NMFS 2014b).

5.3.5 Watershed and Aquatic Habitat Rehabilitation and Management Efforts

Habitat loss was identified as a key reason for the decline of salmon populations in the Trinity River (CDFG 2004; NMFS 2014b). Improvements to and increases in habitat will benefit NOR coho salmon and their prey, which should increase the number and distribution of NOR coho...
salmon. More NOR coho salmon in the rivers would lead to a larger proportion of NOR versus HOR coho salmon, and shifts in the habitat distribution could reduce competition with HOR coho salmon.

The State of California, Federal agencies, local tribes, and private companies and organizations have worked to change management policies and actions to rehabilitate the watershed, tributaries, and estuary and recover listed species and their habitats. Approximately 70 percent of the land in the Trinity Basin is owned by the public, either the U.S. Forest Service or Bureau of Land Management (EPA 2001). The Forest Service and Bureau of Land Management have reduced timber harvest, building of roads, and significantly changed their land management policies over the last 20 years by implementing the Forest Service’s Northwest Forest Plan and developing a restorative approach to watershed management.

CDFW and NMFS have provided action plans and lists of specific rehabilitation projects and management actions that will aid in rehabilitating aquatic habitats and recovering coho salmon and other aquatic species (CDFG 2004; NMFS 2014b). Priorities for recovering the Trinity River watershed include increasing instream flows by reducing illegal water diversions, constructing off-channel ponds, and protecting and recovering salmon and freshwater resources. In marine and freshwater areas, development will continue to be encouraged away from ecologically important and sensitive nearshore areas and estuaries, and reducing pollution is a priority. Preserving the natural functions of the ecosystem and supporting sustainable economic growth will encourage overall improvement. Local community efforts, such as smaller community habitat restoration and protection efforts, will help protect sensitive areas in the Trinity River watershed.

Multiple state and Federal grant programs fund restoration actions, including the Fisheries Restoration Grant Program (FRGP). The FRGP uses the recovery plans to restore anadromous salmonid habitat with the goal of ensuring species survival and protection. Over the past 30 years, the FRGP has funded projects throughout California with multiple projects inside the project area. It is expected that California State and Federal Agencies will continue to support habitat-based recovery. California created the Salmon Recovery Funding Board, which administers Federal and California State funds to protect and restore salmon and steelhead habitat. Federal agencies and organizations are expected to continue to support habitat protection, and inter-agency restoration initiatives like the Trinity River Restoration Program will make those efforts even more efficient.

In summary, the rehabilitation and management actions conducted by Federal, state, corporate, and private entities are helping, and will continue to help, restore degraded habitat conditions. Collectively, these programs will help to counterbalance habitat degradation and long-term detrimental cumulative impacts on natural resources in the cumulative effects project area, which have previously contributed to Federal and state listings of fish and wildlife species (Sections 3.2 Salmon and Steelhead and 3.3 Other Fish Species).
5.4 Cumulative Effects Analysis by Resource

The following provides an assessment of the cumulative effects of Alternative 1 and Alternative 2, in context with the past, present, and on each resource analyzed in this EA: water quantity and quality, salmon and steelhead, other fish species, environmental justice, and cultural resources. The effects of the five major past and present management action categories formed the affected resources’ existing conditions and all the actions will continue as the foreseeable future actions.

5.4.1 Water Quality

To address temperature and sediment issues, TMDL allocations ensure that water quality standards are met (EPA 2001). Resource extraction actions such as timber harvest and gravel mining use water in a variety of operations (e.g., road dust abatement, growing trees, and washing sediments). While the exact amount of water currently diverted for marijuana cultivation within the project area is unknown, recent field reviews by CDFW and law enforcement have revealed water contamination from pesticides, herbicides, and fuels (Bauer et al. 2015). The effects of marijuana cultivation are expected to continue until proper enforcement, permitting, and oversight can be obtained.

Watershed and aquatic rehabilitation and management actions will likely help improve water quantities and quality by reducing sediment erosion (e.g., further disconnecting the road system from the stream system) and improving wood loading. These effects are expected to have a low beneficial effect on the water quantities and quality unless these actions can help address marijuana cultivation issues and encroachment of the river from levees and infrastructure. Watershed rehabilitation efforts to reconnect tributaries and improve habitat can increase the number of NOR coho salmon and improve water quality.

Neither Alternative 1 nor Alternative 2 are expected to result in significant cumulative impacts.

5.4.2 Salmon and Steelhead

Salmon and steelhead abundance naturally alternates between higher and lower levels on large temporal and spatial patterns that may last centuries and on more complex ecological scales than can be easily observed (Rogers et al. 2013). Current run-sizes of salmon and steelhead in the project area are depressed and SONCC coho salmon are ESA-listed. This subsection provides a brief overview of the effects of anticipated future actions on salmon and steelhead.

Salmonid harvest directly affects the salmon and steelhead populations in the Trinity River. As annual harvest guidelines change to fit each season’s forecast, the direct effects will be evaluated in subsequent years. Careful harvest management and recovery efforts must continue to be implemented to support the depressed populations in the Trinity River watershed. Hatchery production at TRH also affects the salmonid populations in the Trinity River. The TRH HGMP (NMFS 2020) attempts to limit the effect of hatchery fish on natural salmonid populations.

The ongoing effects described in Subsection 5.3.1, Resource Extraction Actions, continue to affect aquatic habitat used by salmon and steelhead. Regulatory changes for increased
environmental protection (i.e. new California forest practice rules, monitoring, and enforcement) have helped reduce the effects of resource extraction on salmon and steelhead in fresh and marine waters. However, resource extraction continues to have low to moderate adverse effects on salmon and steelhead habitat, to water quality, and contribute to salmon and steelhead mortality. Resource extraction actions would more likely affect species that reside in the lower river and estuary as the effects accumulate along the river and are compounded by development in the lower reaches. Effects from resource extraction are expected to have a low to moderate adverse effect on salmon and steelhead under both alternatives.

Trinity River water management actions may provide some low moderate beneficial effects including increased habitat with higher summer and early fall flows, cooler temperatures, and some buffering effects from the increasing air and water temperatures associated with climate change. While the community responses to the BOR’s water planning process emphasize the need and desire to support instream flows for fish, economics will ultimately drive selection of the BOR’s water management scenarios. Rehabilitative water management actions may not fully mitigate for the adverse impacts of climate change and resource extraction actions on salmon and steelhead and their associated habitats.

Rehabilitation of habitat in the project area will improve salmon and steelhead habitat under all alternatives, with particular benefits to freshwater and estuarine environments that are important for the survival and reproduction of fish. However, the low beneficial effects from watershed and habitat rehabilitation will not substantially increase survival and abundance of salmon and steelhead without other improvements. In addition, rehabilitation is dependent on continued funding, which is difficult to predict over time. Benefits from watershed and habitat rehabilitation are expected to affect salmon and steelhead survival similarly under both alternatives.

In summary, the management actions may maintain or continue to improve salmon and steelhead status and habitat over time under both alternatives, which will not have a significant cumulative effect on the abundance and productivity of NOR salmon and steelhead and HOR populations. Neither of the alternatives would affect the overall trend in cumulative effects on salmon and steelhead.

5.4.3 Other Fish Species

Other fish species that have a relationship to coho salmon include rainbow trout, sturgeon, lamprey, forage fish, and resident freshwater fish. Like coho salmon, these fish species require and use a diversity of habitat and may be affected by the major action categories because of the overall potential for loss or degradation of aquatic habitat or the inability to adapt to shifting climatic conditions. It is difficult to predict the extent to which Trinity River water management and rehabilitation actions may mitigate the impacts from resource extraction and climate change. However, benefits from watershed and habitat rehabilitation are expected to affect other fish species similarly under both alternatives.
In summary, the cumulative effects of the various future actions under the two alternatives would not have significant impacts on the abundance of fish species that compete, prey on, or are prey items for coho salmon. Neither of the alternatives would affect the overall trend in cumulative effects on other fish species because the harvest levels under Alternative 1 or Alternative 2 would be a small fraction of the total salmon and steelhead in the project area with which these other fish species could interact.

5.4.4 Environmental Justice

The environmental justice community of concern in the project area includes American Indians and people living below poverty. Under Alternative 1 and Alternative 2 the existing fisheries would continue under current conditions. Regardless of the effects of resource extraction, Trinity River water management, ocean fish harvest, fire management, and watershed and aquatic rehabilitation and management actions, neither Alternative 1 nor 2 would result in a significant impact on environmental justice.

5.4.5 Cultural Resource

The existence of the status quo fisheries in the project area contribute to the cultural integrity and well-being of the tribes. The maintenance of natural resource practices for HVT would not result in significant effects on tribal cultural resources. Under both Alternative 1 and Alternative 2, HVT would harvest salmon and steelhead in a manner similar to current conditions and harvest by other tribes would not be significantly impacted. Regardless of the effects of the five action categories discussed above, Alternative 1 and Alternative 2 would not result in a significant impact on cultural resources.

5.5 Cumulative Effects Summary

NMFS recognizes that the Trinity River watershed has experienced substantial effects from a wide array of human-related activities, which led to degraded watershed conditions and habitat, reductions in wildlife, and depressed steelhead and salmon populations (NMFS 2016; Seghesio and Wilson 2016), and multiple ESA-listed species. This conclusion is strongly supported by the references listed throughout this document and all recent regulatory actions (e.g., ESA listings, recovery plans, and TMDLs) and the SONCC Coho Salmon Recovery Plan (NMFS 2014b). However, there are regulations and processes in place to mitigate and limit most of the adverse effects on affected resources (EPA 2001; NMFS 2014b). In addition, multiple agencies, local tribes, and private companies and organizations have worked to change management policies and actions to rehabilitate the watershed, river corridor, and estuary and to recover listed species and their habitats. While all the beneficial actions may not fully mitigate the impacts of climate change and other management actions, the direct and indirect effects of the proposed action on the affected resources, in combination with effects from past, present, and foreseeable future actions on the same affected resources are not expected to be significant.
6. CLIMATE CHANGE

Climate change has been occurring for at least the past 50 years and is expected to continue for decades into the future (IPCC 2014). Climate effects, including changes in river flows, stream temperature, sea surface temperature, ocean acidification will continue to affect salmonids. However, our ability to predict future impacts from climate change on a specific salmon stock remains uncertain. This uncertainty is confounded by the fact that salmon occupy different habitats over their life cycle and climate effects and subsequent natural adaptation may vary across each of these habitats.

While the effects of climate change vary across the globe, the changes in Table 7 will continue to affect natural resources within the project area (Graham Matthews & Associates 2014). These changes include:

- Increased variation in vegetation growth and water quality with warming air and water temperatures;
- Warmer oceans and summer air temperatures combined with extensive fire suppression and timber management may lead to increasing fires frequency and post-fire sediment influxes (e.g., debris flows);
- Changes in plant, fish, and wildlife species’ distributions and increased potential for invasive species;
- Changes in streamflow runoff and river and ocean temperatures may shift the timing of life history events, changes in growth and development rates, and changes in habitat availability;
- Less spring runoff and changes in BOR operations with less snowpack.
Table 7. Likelihood of climate change effects within the cumulative effects area.

<table>
<thead>
<tr>
<th>Effects of Climate Change</th>
<th>Likelihood of Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing air and water temperatures</td>
<td>High</td>
</tr>
<tr>
<td>Reduced winter and spring snowpack</td>
<td>High</td>
</tr>
<tr>
<td>Earlier spring peak flow</td>
<td>High</td>
</tr>
<tr>
<td>Reduced summer stream flow into the Trinity River</td>
<td>High</td>
</tr>
<tr>
<td>Higher air and water temperatures</td>
<td>High</td>
</tr>
<tr>
<td>Warmer ocean temperatures</td>
<td>High</td>
</tr>
<tr>
<td>Increased ocean acidity</td>
<td>High</td>
</tr>
<tr>
<td>Changing precipitation patterns</td>
<td>Moderate</td>
</tr>
<tr>
<td>Changing flood frequency</td>
<td>Moderate</td>
</tr>
<tr>
<td>Rising sea level</td>
<td>Moderate</td>
</tr>
<tr>
<td>Shifting offshore upwelling patterns</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

The negative effects of the above climate changes on SONCC coho salmon are difficult to predict due to the complex interactions of biotic and abiotic factors and uncertainties in our understanding of the rate at which adaption would occur.

Under both alternatives, NMFS assumes that the effects of continued varying levels of harvest in the project area would have similar effects when amplified by the effects of continued climate change. Direct and indirect effects of the proposed action described above are of relatively short duration (i.e., < 10 years) and climate change predictions for that period are not likely to differ from current climate conditions and their associated variability. Neither Alternative 1 nor Alternative 2 would contribute significantly to climate change impacts.
7. LITERATURE CITED


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