Final Environmental Assessment

Russian River Steelhead Integrated Harvest Hatchery Program

Russian River Watershed, California

February 2024

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ACRONYM LIST

CA HSRG	California Hatchery Scientific Review Group
CC	California Coastal
CCC	Central California Coast
CCRWQCB	Central Coast Regional Water Quality Control Board
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CFS	Cubic Foot Per Second
CVFF	Coyote Valley Fish Facility
DCFH	Don Clausen Fish Hatchery
DPS	Distinct Population Segment
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
FPP	Fish Per Pound
HGMP	Hatchery Genetic Management Plan
HSRG	Hatchery Scientific Review Group
HOR	Hatchery-Origin
NCRWQCB	North Coast Regional Water Quality Control Board
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOR	Natural-Origin
NPDES	National Pollutant Discharge Elimination System
pHOS	Proportion of Natural Spawning Population Consisting of Hatchery Origin Fish
PNI	Proportionate Natural Influence
pNOB	Proportion of Hatchery Broodstock Consisting of Natural Origin Fish
SCSCBP	Southern Coho Salmon Captive Broodstock Program
SWFSC	Southwest Fisheries Science Center
SWRCB	State Water Resources Control Board
USACE	United States Army Corps of Engineers

1 INTRODUCTION

The National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS) is the lead agency responsible for administering the Federal Endangered Species Act (ESA) (16 U.S.C. 1531 *et seq.*) as it relates to listed salmon and steelhead. Actions that may affect listed species are reviewed by the National Marine Fisheries Service (NMFS) under section 7 and section 10 of the ESA, or under section 4(d), which can be used to limit the application of take prohibitions described in section 9.

The United States Corps of Engineers (USACE) and California Department of Fish and Wildlife (CDFW) provided NMFS with a section 10(a)(1)(A) enhancement permit application and hatchery genetic management plan (HGMP) for the Russian River Steelhead Integrated Harvest program (Program) (USACE and CDFW 2020). The HGMP provides a framework for the breeding, rearing, releasing, and associated monitoring and evaluation activities that will occur in streams of the Russian River watershed known to support populations of the federally threatened Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) Distinct Population Segment (DPS).

NMFS seeks to consider, through National Environmental Policy Act (NEPA) analysis, how its pending actions may affect the natural and physical environment and the relationship of people with that environment. The NEPA analysis provides an opportunity to consider, for example, how the action may affect conservation of non-listed species and socioeconomic objectives that seek to balance conservation with the use of affected resources and other legal and policy mandates.

On October 29, 2021, the USACE submitted an ESA enhancement permit application and associated HGMP for the Program to NMFS Central California Coastal Office. If NMFS determines that the application meets all applicable criteria, NMFS will issue the ESA section 10(a)(1)(A) enhancement permit to the USACE for operation of the Program as described in the HGMP (Appendix A) and summarized in this section.

A public commenting period for this EA took place from November 29, 2022 through December 29, 2023 (87 FR 73288). NMFS received no public comments.

This Environmental Assessment (EA) is being prepared using the 2020 CEQ NEPA Regulations. The effective date of the 2020 CEQ NEPA Regulations was September 14, 2020, and reviews begun after this date are required to apply the 2020 regulations unless there is a clear and fundamental conflict with an applicable statute. 85 Fed. Reg. at 43372-73 (§§ 1506.13, 1507.3(a)). This EA began on January 25, 2022, and accordingly proceeds under the 2020 regulations.

1.1 Description of the Proposed Action

The USACE/CDFW proposes to rear hatchery steelhead to produce fish for harvest in sport fisheries in the Russian River, California. Hatchery production is required to "mitigate" for the loss in natural steelhead production due to the construction of Warm Springs and Coyote Valley dams by the USACE (Figure 1).

The proposed hatchery program releases up to 500,000 yearling steelhead smolts (8 fish per pound (fpp)) at the Don Clausen Fish Hatchery (DCFH), aka Warm Springs Hatchery, located at Warm Springs dam on Dry Creek, and the Coyote Valley Fish Facility (CVFF) located on the East Fork of Russian River in the upper basin below Coyote Valley dam (Figure 1). Of the 500,000 smolts released, a maximum of 200,000 may be produced/released at DCFH and up to 300,000 at CVFF so long as Program performance metrics identified in the Hatchery Genetic Management Plan (USACE and CDFW 2021) are achieved. Until the metrics are achieved, hatchery production will be limited to 400,000 fish (200,000 released from each facility). Steelhead production from DCFH will no longer be released to Dry Creek to reduce ecological effects to CCC Coho salmon and CC Chinook inhabiting these streams. The goal of the Program is to provide adult steelhead for harvest by sport fishers in the Russian River.

The Program will be operated consistent with the recommendations of the California Hatchery Scientific Review Group (CA HSRG) and the Hatchery Scientific Review Group (HSRG) of the Columbia River. Operating the program consistent with the recommendations of these two HSRGs is expected to reduce effects to naturally produced Russian River steelhead and thereby support restoration efforts for this species (CA HSRG 2012, HSRG 2014).

The Program will be operated as an integrated type as defined by the HSRG (2014):

> *"In an ideal integrated program natural-origin (NOR) and hatchery-origin fish (HOR) represent two components of a single gene pool that is adapted to the natural habitat."*

The DCFH and CVFF components will be integrated with the Dry Creek and Upper Russian River steelhead populations, respectively. Program integration is achieved by incorporating NOR adults into the broodstock and controlling the proportion of the HOR adults spawning naturally. NOR adults for the two programs would come from fish arriving at the two hatcheries, traps, seines (both juveniles and adults) or from sport fishers.

Since the publication of the draft EA, there has been the detection of New Zealand Mud Snails (NZMS) at the DCFH and at the outlet of CVFF in 2023. The detection of NZMS has prompted CDFW's steelhead program to redouble its efforts to avoid the spread of this aquatic invasive species. To ensure this, steelhead outplantings continue to be limited to areas that are already NZMS positive. Steelhead outplantings are supported by NZMS presence confirmation surveys in advance of releases. CDFW will continue to operate consistent with all federal and state policies, including conforming to the National Pollution Discharge Elimination and Aquatic Invasive Species testing and reporting requirements. In addition, CDFW will explore eradication procedures to eliminate NZMS from all facilities as well as the waters and equipment used for transport, to broaden the list of waters eligible to receive steelhead outplantings in the future.

The program proposes to conduct monitoring to quantify program effects to ESA-listed salmon species and inform the Technical Advisory Committee (TAC) on Program progress and need for additional actions to achieve performance metrics.

NMFS is reviewing the ESA section 10(a)(1)(A) permit application submitted by the USACE and CDFW to evaluate whether the application meets applicable criteria specified in section

10(a)(1)(A) of the ESA and NMFS' implementing regulations. If the application meets the requirements of the ESA, NMFS will issue an ESA section 10(a)(1)(A) enhancement permit. Additionally, NMFS is reviewing the effects of the Program under section 7 of the ESA to determine whether issuance of the enhancement permit is likely to jeopardize the continued existence of any endangered or threatened species or result in destruction or adverse modification of any critical habitat.

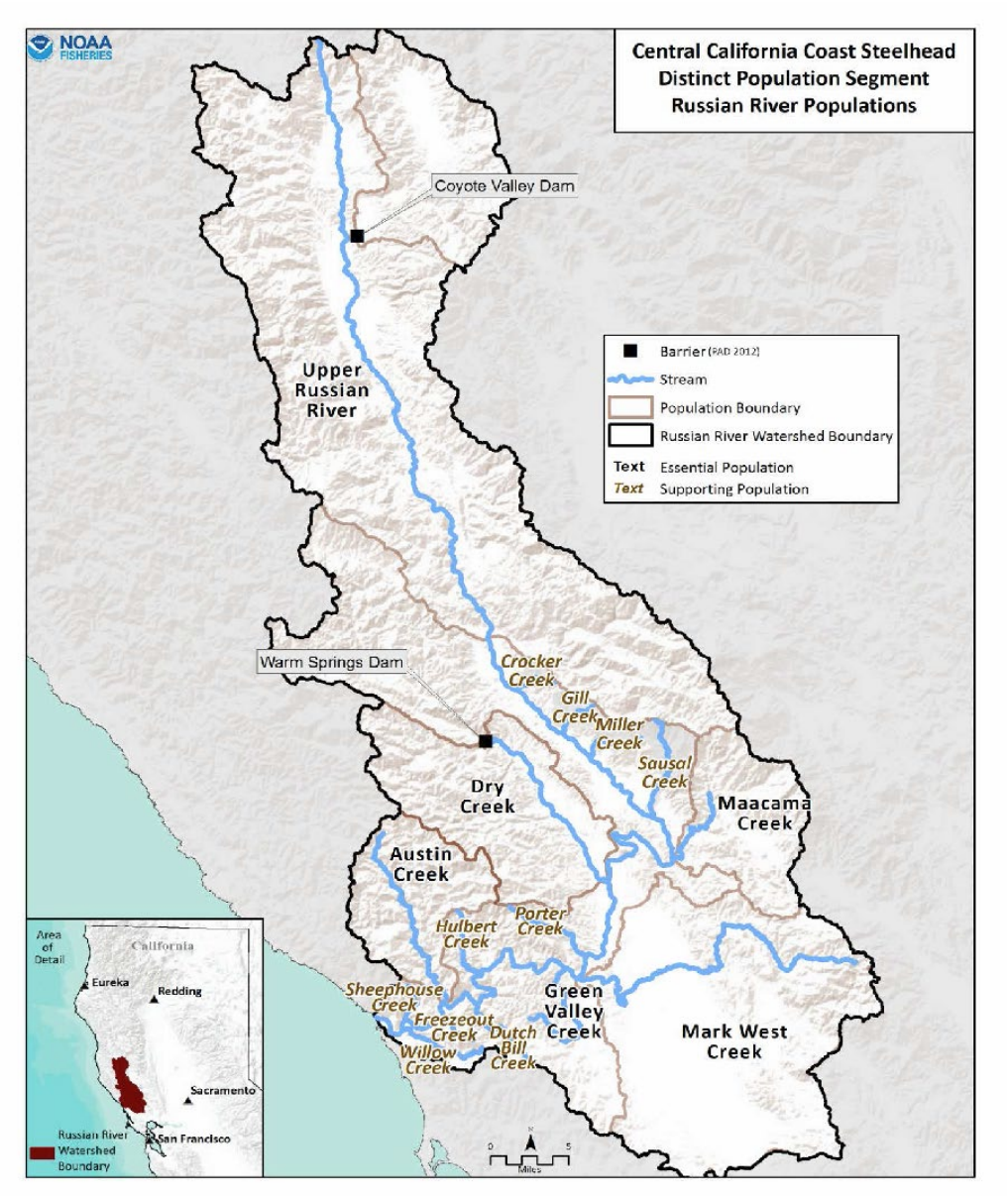


Figure 1. Locations of Don Clausen Fish Hatchery (below Warm Springs Dam on Dry Creek) and Coyote Valley Fish Facility (below Coyote Valley dam on the East Fork) and associated steelhead populations (from NMFS 2016a) within streams in the Russian River, California. Essential and supporting steelhead population geographic delineations are also presented.

The following hatchery production activities, as described in the HGMP, have the potential to affect the CCC steelhead DPS, CCC Coho Salmon Evolutionary Significant Unit (ESU) and CC Chinook ESU:

- Collection and transport of broodstock including natural origin juveniles,
- Holding, identification, and spawning of adult fish,
- Egg incubation and rearing,
- Marking of hatchery-origin juveniles,
- Juvenile and adult releases, and
- Monitoring and evaluation to assess Program performance and effects to ESA listed species.

1.2 Purpose and Need

The purpose of the action is for NMFS to evaluate and approve the ESA section 10(a)(1)(A) enhancement permit to the USACE for the operation of the Program as described in the HGMP. The need for the action is to determine whether the issuance of the enhancement permit and the associated propagation of hatchery-origin (HOR) CCC steelhead, would result in the enhancement of or survival of CCC natural-origin (NOR) steelhead, while avoiding substantial adverse impacts, to CCC Coho Salmon and CC Chinook Salmon in the project area.

1.3 Project Area

The Project Area is the geographic area where the Program would take place. This includes the location of activities described in the HGMP and associated production facilities, consisting of the DCFH and CVFF (Figure 1).

The project area consists of one functionally independent population (Upper Russian River) and five potentially independent CCC steelhead populations, Austin Creek, Green Valley Creek, Mark West Creek, Maacama Creek, and Dry Creek (Figure 2) as defined by Spence et al 2008[1]. There are also 10 dependent CCC steelhead populations in the project area which are also displayed in Figure 2.

[1] *Potentially independent populations*: populations with a high likelihood of persisting over 100-year time scales, but that are too strongly influenced by immigration from other populations to exhibit independent dynamics.

Functionally independent populations: populations with a high likelihood of persisting over 100-year time scales and that conform to the definition of independent "viable salmonid populations".

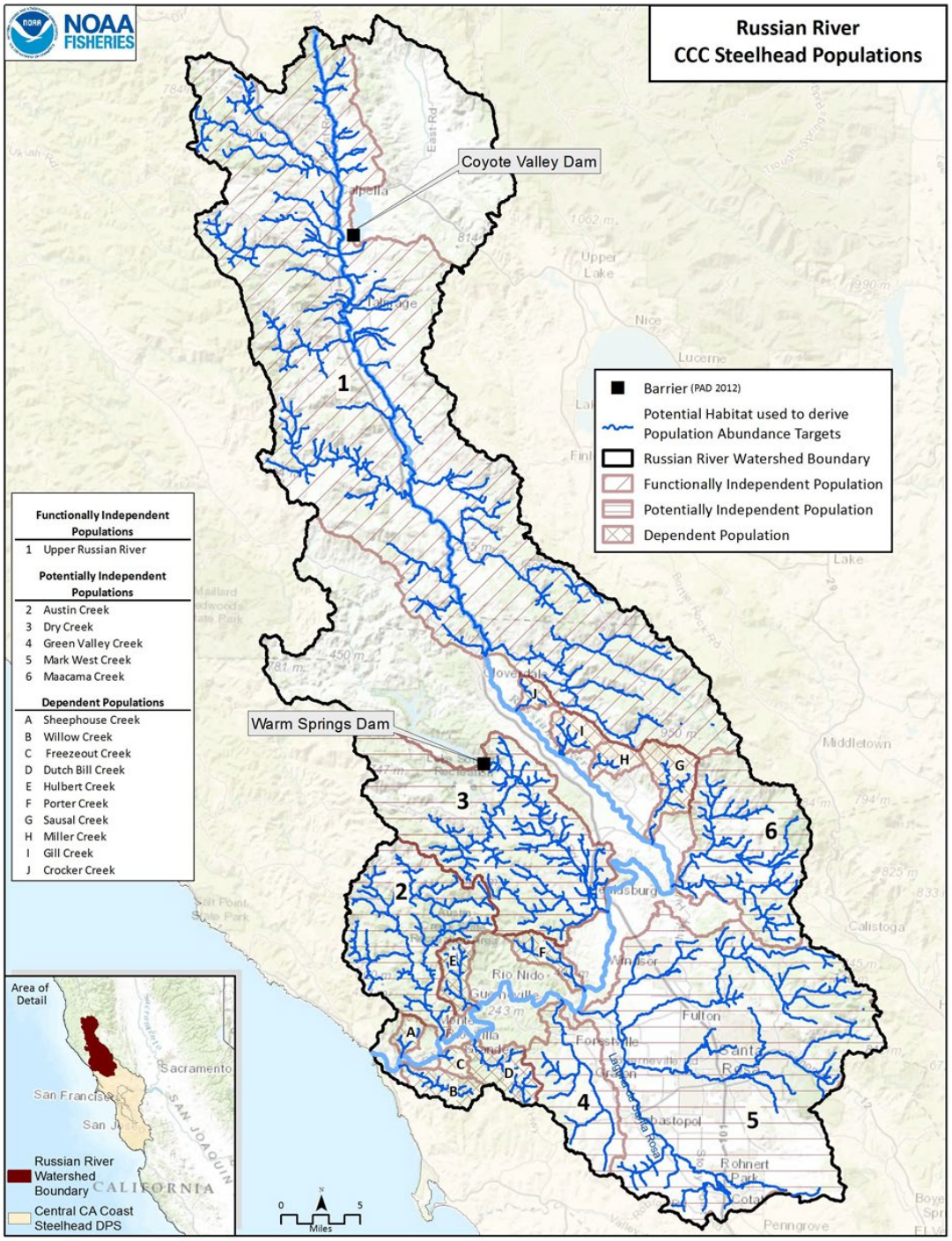


Figure 2 . Russian River CCC steelhead functionally dependent, potentially independent, and dependent populations.

2 ALTERNATIVES

2.1 Alternatives Analyzed in Detail

The Russian River Steelhead HGMP Technical Advisory Committee (TAC), of which NMFS is a member, completed a detailed alternatives analysis of various collection, rearing and release alternatives, to select the approach described in the HGMP (Appendix A of HGMP, USACE and CDFW 2021). The USACE hatchery programs, which CDFW operates under contract, are mandated by the U.S. Congress to mitigate for the loss of steelhead habitat caused by the construction of Warm Springs Dam and Coyote Valley Dam. Because of this mandate it is uncertain whether artificial production activities would or would not continue if NMFS failed to issue an ESA section 10(a)(1)(A) permit to the Program. To cover the range of likely hatchery production levels[2] and activities if a permit was not approved by NMFS, the EA evaluates two No Action alternatives:

- Alternative 1: Do Not Issue the Section 10(a)(1)(A) Permit; Do not Approve the HGMP (No Action – No Production). Represents outcomes and effects if steelhead hatchery production is eliminated.
- Alternative 2: Do Not Issue the Section 10(a)(1)(A) Permit; Do not Approve the HGMP (No Action – Status Quo Production). Represents outcomes and effects for steelhead hatchery production and activities that were in place pre-2020.[3]

The third alternative evaluated in the EA is based on the hatchery steelhead production levels and activities described in the HGMP:

- Alternative 3 - Issue the Section 10(a)(1)(A) Permit with Conditions and Approve the HGMP (Proposed Action).

The EA assumes that hatchery production levels for each alternative will not be exceeded. Actual broodstock collection and utilization, as well as juvenile production and release levels for the program are expected to vary over time, dependent on the ability to achieve identified performance measures and metrics. Because of this possible variability in production, the potential for chronic exceedance of production levels within an NMFS-approved permit is addressed as part of the ESA section 7 consultation process.

Although this EA includes 3 numbered alternatives, Alternatives 1 and 2 are merely different analytical baselines, but they involve the same underlying agency action, no permit issuance. The agency decision is a dichotomous choice between permit issuance under Alternative 3, and no permit issuance under Alternatives 1 and 2. Therefore, NMFS is considering the only two options available. The expected effects differ between Alternatives 1 and 2 exclusively because of uncertain future actions by non-NMFS entities.

[2] Because of rearing space constraints at the hatcheries, it is highly unlikely that production could be increased and therefore such an outcome was not analyzed.
[3] In the submitted HGMP, this time was defined as current conditions.

2.1.1 Alternative 1: Do Not Issue the Section 10(a)(1)(A) Permit; Do not Approve the HGMP (No Action – No Production)

Under this alternative, NMFS would determine that the submitted permit application fails to meet the criteria necessary to issue an ESA section 10(a)(1)(A) permit, and NMFS would not issue the ESA section 10(a)(1)(A) permit to the USACE. Because the ESA section 10(a)(1)(A) permit would not be issued, the hatchery actions proposed by USACE would not have ESA take exemptions, exposing them to liability for taking under section 9 of the ESA. NMFS treats Alternative 1 as resulting in the termination of the steelhead hatchery program, and production would cease until a new permit application is submitted, and the applicants are granted an ESA section 10(a)(1)(A) permit.

2.1.2 Alternative 2: Do Not Issue the Section 10(a)(1)(A) Permit; Do not Approve the HGMP (No Action - Status Quo Production)

Under this alternative, NMFS would determine that the submitted permit application fails to meet the criteria necessary to issue an ESA section 10(a)(1)(A) permit, and NMFS would not issue the ESA section 10(a)(1)(A) permit to the USACE. However, because the hatchery program is federally mandated to mitigate for the construction of Warm Springs and Coyote Valley dams, it cannot be terminated without approval of Congress. Thus, for this alternative NMFS assumes that the program would operate as it did prior to 2020 (Status Quo). The period (pre-2020) is the same as current conditions in the HGMP, thus the terms are interchangeable.

Status quo hatchery operations would continue until a new permit application is submitted, and the applicants are granted an ESA section 10(a)(1)(A) permit. As is the case for Alternative 1 (No Action – No Production), the USACE would not have ESA take exemptions, exposing them to liability for taking under section 9 of the ESA until a future permit application is approved.

2.1.3 Alternative 3: Issue the Section 10(a)(1)(A) Permit with Conditions and Approve the HGMP (Proposed Action and Proposed Action)

The Proposed Action is to issue a permit under section 10(a)(1)(A) of the ESA to USACE for the Program as described in the HGMP. The permit would remain in effect for a period of ten years and authorize the USACE to produce and release 200,000 yearling steelhead smolt at DCFH and 200,000 at CVFF until the performance objectives described in the HGMP are met. Once the performance objectives are achieved, the program may release up to 500,000 HOR yearling steelhead smolts (8 fpp) into the Russian River basin each year.

2.2 Alternatives Considered but Not Analyzed in Detail

The HGMP analyzed two additional alternatives for implementation:

- Alternative 4 - Reduce Hatchery Production to 100,000 Total Yearling Smolts releases from DCFH and CVFF Combined; and
- Alternative 5 – Integrated Harvest Program.

In Alternative 4, hatchery production of steelhead was reduced to 100,000 yearling smolts. Although this reduction achieved pHOS[4] and pNOB[5] targets without the implementation of other Program changes, this alternative was eliminated as it did not meet the program purpose of providing acceptable steelhead harvest opportunity in sport fisheries in sufficient numbers to mitigate for the loss of natural steelhead production from the construction of Warm Springs Dam and Coyote Valley Dam by the USACE.

Alternative 5 was designed to increase the number of hatchery steelhead harvested in the Russian River. Harvest rates and policy would be changed so that 50% of the hatchery steelhead returning to the basin would be harvested in sport fisheries. This alternative was not selected because the program did not have the ability or authority to alter California fishing regulations with any sure certainty following development of such a program.

A description of these alternatives and their effects on CCC Coho Salmon, CCC steelhead and CC Chinook, if implemented, can be found in Appendix A of the HGMP (USACE and CDFW 2021).

3 AFFECTED ENVIRONMENT

3.1 Introduction

The affected environment in this analysis is defined as that portion of the physical and biological environment that may be affected by the implementation of the alternatives described in Section 2. This chapter describes the existing conditions for the following resources that may be affected by the three alternatives considered in this EA:

- Water Resources (Section 3.2)
- Salmon and Steelhead (Section 3.3)
- Other Fish Species (Section 3.4)
- Wildlife (Section 3.5)
- Cultural Resources (Section 3.6)

The proposed action is not expected to have effects on other resources (i.e., geologic resources, air quality, noise and visual resources, vegetation, and species of wildlife other than those addressed), therefore, those resources are not specifically addressed in this analysis.

3.2 Water Resources

The program has the potential to affect the water resources of the Russian River located in California. Specifically, the operation of the DCFH and CVFF, affects Dry Creek, a Russian River tributary, and the east fork of the Russian River, respectively. Both streams flow into the mainstem Russian River so effects may occur in this waterbody as well.

[4] pHOS is the proportion of the natural spawning population consisting of hatchery-origin (HOR) fish.
[5] pNOB is the proportion of hatchery broodstock consisting of natural-origin (NOR) fish.

3.2.1 Water Quantity

3.2.1.1 Don Clausen Fish Hatchery (DCFH)

Surface water is obtained for hatchery use from the stilling basin of Warm Springs dam. The water released from the reservoir of the dam, Lake Sonoma, can be taken from four different intake portals. The total hatchery water demand for full capacity fish production (Coho Salmon and steelhead) and operations is 40 cubic-feet-per-second (cfs). When broodstock collection and holding operations are occurring, the demand increases to approximately 63 cfs. The increase in water is needed to attract adult fish migrating upstream (16 cfs) and to maintain fish in holding ponds (7 cfs) once they enter the hatchery. Water used for hatchery operations is used to meet minimum flow requirements for Dry Creek as required by the State Water Resources Control Board (SWRCB) for the lower Russian River.

3.2.1.2 Coyote Valley Fish Facility (CVFF)

Surface water is supplied to the CVFF by the City of Ukiah, which operates the Lake Mendocino Hydroelectric Power Plant. Under normal operating conditions when the plant is generating power, the CVFF water is supplied by gravity flow by diverting a portion of water from the power plant penstock. When the power plant is not operating, water for the CVFF facilities can be pumped from the stilling well located at the dam outlet works.

Total hatchery water demand for the steelhead program is 18 cfs dependent on the time of year and life stage being reared or held. Water used for hatchery operations is also used to meet minimum flows in the East Fork Russian River as required by the SWRCB for the upper Russian River.

3.2.2 Water Quality

3.2.2.1 Don Clausen Fish Hatchery (DCFH)

Settling basins have been installed at DCFH to ensure that hatchery effluent discharges comply with the discharge standards and conditions of the NPDES permit. Discharged water from the DCFH is regulated by NPDES Permit No. CA0024350, I.D. No. 1B84034050N was issued by the North Coast Regional Water Quality Control Board (NCRWQCB). Discharge standards were established for the DCFH by the NCRWQCB based on designated beneficial uses for the subject waters, and include standards for turbidity, suspended sediment concentrations, temperature, and dissolved oxygen (Table 1). Apart from dissolved oxygen in some years, DCFH has been in continuous compliance with its NPDES permit requirements.

Permits further stipulate that sampling occurs during cleaning operations because this is the component of fish production most likely to produce poor water quality conditions. At DCFH, discharge detectable levels of chemicals used for the treatment or control of disease, other than salt (NaCl), is prohibited.

3.2.2.2 Coyote Valley Fish Facility (CVFF)

Settling ponds are used to ensure that hatchery effluent complies with the standards shown in Table 1. Compliance with the standards is monitored by sampling the facility effluent two times per month, with results submitted in a monthly report to the NCRWQCB.

Table 1. Effluent limits of various water quality parameters at DCFH and CVFF per National Pollutant Discharge Elimination System (NPDES) permit #CA0024350/I.D. No. 1B84034050N.

Parameter	Effluent Limit (Daily Maximum)
Total Suspended Solids	15 mg/l
Total Settleable Solids	0.2 ml/l/hr
pH	within 0.5 of receiving waters
Salinity (chloride)	250 mg/l
Temperature	no measurable change to receiving water
Turbidity	no increase > 20% of background
DO	> 7.0 mg/l
Flow – Warm Springs	15.5 million gallons/day

3.3 Salmon and Steelhead

Information on the population status of the ESA listed salmon and steelhead species in the Russian River can be found in the NMFS 5-year status reviews (NMFS 2016a, 2016b and 2016c). Additional information is provided below by species.

3.3.1 Central California Coast (CCC) Steelhead

The CCC steelhead (*Oncorhynchus mykiss*) Distinct Population Segment (DPS) was listed as a federally threatened species on August 18, 1997 (62 FR 43937). Following a status review on January 6, 2005, NMFS issued a final determination that CCC steelhead remains a threatened species as previously listed (71 FR 834). The CCC steelhead DPS includes all naturally spawned populations of steelhead (and their progeny) in streams from the Russian River to Aptos Creek, and the drainages of San Francisco and San Pablo Bays. The Project area occurs within the critical habitat for CCC steelhead, which was designated on September 2, 2005 (70 FR 52488).

The NMFS defined low adult abundance viability targets for steelhead populations in the Project Area are provided in Table 2.

According to the federal steelhead recovery plan (NMFS 2016a), little information is available on the historic abundance of adult steelhead in the Russian River watershed. Russian River winter steelhead were thought to have spawned and reared in all 6 independent and 10 dependent populations, the mainstem, and 240 named tributaries. Historically, upwards of 65,000 adult steelhead may have been present in the river system, dropping to 1,750-7,500 in the 1990's.

Table 2. List of Essential and Supporting CCC steelhead DPS populations in the Project Area and their Low Adult Abundance Viability Criterion as described by Spence et al. 2008.

Essential Populations (Independent populations)	**Low Adult Abundance Viability Target**
Austin Creek (Potentially Independent, North Coastal Diversity Stratum)	2,800
Green Valley Creek (Potentially Independent, North Coastal Diversity Stratum)	1,000
Mark West Creek (Potentially Independent, North Coastal Diversity Stratum)	3,300
Maacama Creek (Potentially Independent, Interior Diversity Stratum)	2,400
Dry Creek (Potentially Independent, Interior Diversity Strata)	3,000
Upper Russian River (Functionally Independent, Interior Diversity Stratum)	8,500
Supporting Populations (Dependent populations)	**Low Adult Abundance Viability Target**
North Coastal Diversity Stratum	No adult abundance target
● Willow Creek	
● Sheephouse Creek	
● Freezeout Creek	
● Dutch Bill Creek	
● Porter Creek	
● Hulbert Creek	

Interior Diversity Stratum	
• Crocker Creek	
• Gill Creek	
• Miller Creek	
• Sausal Creek	

Based on video counts of fish at Mirabel Dam, located on the mainstem Russian River, the adult steelhead (hatchery origin + natural origin) annual index of production averaged 367 fish from 2000-2016 (Table 3). Naturally and hatchery produced steelhead abundance ranged from 0-306, and 0-641 fish respectively over this time-period (Table 3). Because the dam counts occurred over a small portion of the total steelhead run-timing the numbers are considered an index of adult steelhead abundance.

Additionally, the HGMP used estimates of adult returns to the two hatchery facilities, the ratio of the number of hatchery fish to natural origin fish encountered in sport fisheries, the number harvested in sport fisheries and an assumed HOR stray rate (30%) to develop estimates of total adult HOR and NOR adult steelhead production (Table 4). Based on 10 years of data, the HGMP estimated that the average number of HOR and NOR adults in the Russian River is 8,103 and 4,203, respectively.

Table 3. Mirabel fish ladder counts of CCC steelhead in the Russian River (2000-2015). The dam counts occur over a small portion of the steelhead run and do not include any steelhead returning to the streams located downstream of Mirabel Dam (e.g., Austin Creek).

	Mainstem Mirabel fish ladder (underwater video augmented with DIDSON)							
Return Year	Steelhead (Total) [1]	Steelhead (unknown-origin) [1]	Steelhead (NOR)	Steelhead (HOR)	Installation Date	Removal Date	Days in season	Days Operated
2000-2001	532	200	106	226	8/1/00	1/10/01	163	158
2001-2002	0	0	0	0	8/7/01	11/13/01	99	98
2002-2003	102	11	39	52	8/6/02	12/10/02	127	119
2003-2004	78	20	8	50	8/1/03	12/1/03	123	118
2004-2005	206	4	88	114	8/1/04	12/7/04	129	128
2005-2006	66	13	16	37	8/2/05	11/30/05	121	112
2006-2007	1561	739	192	630	8/14/06	6/27/07	318	302
2007-2008	329	119	110	100	8/15/07	12/17/07	125	124
2008-2009	209	22	74	113	8/15/08	12/22/08	130	130
2009-2010	156	22	72	62	8/15/09	12/16/09	124	119
2010-2011	162	62	39	61	9/1/10	12/5/10	96	96
2011-2012	644	38	159	447	9/1/11	1/17/12	139	139
2012-2013	137	23	54	60	9/1/12	11/21/12	82	82
2013-2014	955	8	306	641	9/1/13	2/8/14	161	161
2014-2015	Not operated due to construction of new fish ladder - operation commenced again for 2016-17 return year.							
2015-2016								
Average	367	91	90	185			138	135

Table 4. The estimated number of HOR steelhead returning to hatchery facilities, number harvested, and total HOR and NOR production assuming an adult HOR stray rate of 30% (2006-2015).

	Estimated Hatchery Production					
Year	DCFH	CVFF	Harvested	Strays	Total Hatchery (HOR)	Estimated Wild (NOR)
2006	6,785	3,677	328	3,237	14,027	5,073
2007	6,677	3,745	1,568	3,597	15,587	7,678
2008	3,841	3,156	388	2,216	9,601	8,718
2009	870	371	323	469	2,033	818
2010	1,412	859	162	730	3,163	2,614
2011	2,122	1,895	411	1,328	5,756	2,842
2012	2,213	2,861	1,087	1,848	8,009	3,646
2013	4,588	3,618	909	2,735	11,850	5,756
2014	1,880	2,095	542	1,355	5,872	2,717
2015	2,179	1,008	763	1,185	5,135	2,164
Average	3,257	2,329	648	1,870	8,103	4,203

Juvenile steelhead abundance in Dry Creek, where the DCFH is located, is estimated as part of the California Coastal Salmonid Monitoring program (CMP) (Sonoma Water and California Sea Grant 2019). The estimated number of juveniles produced in Dry Creek (and tributaries) has ranged from approximately 30,000 to 60,000 fish (Figure 3).

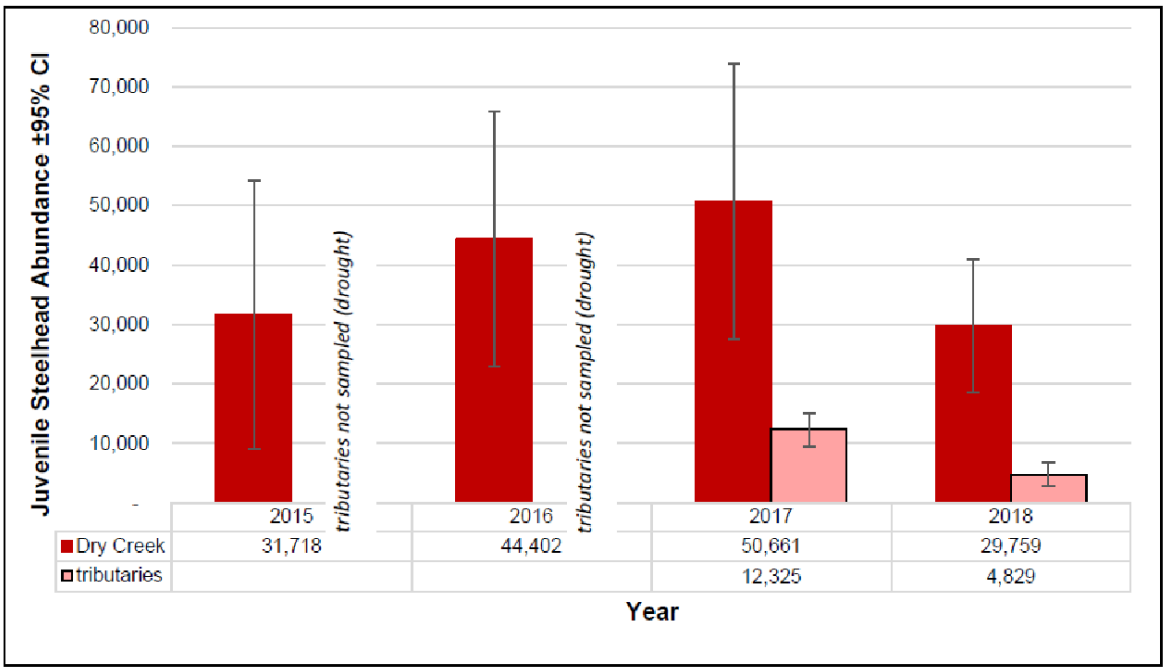


Figure 3. Pre-smolt CCC steelhead population estimates for mainstem Dry Creek from 2015 to 2018 and tributaries to Dry Creek from 2017 to 2018. Tributaries were not sampled from 2015 to 2016 due to low streamflow caused by the drought. (Sonoma Water and California Sea Grant 2019).

Due to a lack of monitoring, data are not available on steelhead juvenile abundance in the East Fork of the Russian River where the hatchery fish produced by CVFF are released.

3.3.2 Central California Coast (CCC) Coho Salmon

The CCC Coho Salmon ESU, currently listed as endangered, was initially listed as threatened on October 31, 1996 (61 FR 56138). On June 28, 2005 (70 FR 37160), the species was reclassified as an endangered species in response to severe population declines (Brown et al. 1994; Adams et al. 1999).

Critical Habitat for CCC Coho Salmon was designated on May 5, 1999 (64 FR 24049). The Project area is in the southern portion of the species range and their designated critical habitat.

The CCC Coho Salmon ESU ranges from Punta Gorda in southern coastal Humboldt County, California, south to Aptos Creek in Santa Cruz County, California. In addition, the ESU includes Coho Salmon from the following artificial propagation programs: the Russian River Coho Salmon Captive Broodstock Program (NMFS 2020a and 2020b), and the Southern Coho Salmon Captive Broodstock Program located at Kingfisher Flat Hatchery. A total of 75 watersheds (populations) in the CCC ESU historically supported Coho Salmon and these populations have been grouped into five diversity strata (i.e., geographically distinct areas with similar environmental conditions) for recovery planning (Bjorkstedt et al. 2005; NMFS 2012). All populations in the CCC Coho Salmon ESU are currently doing poorly due to low abundance,

range constriction, habitat fragmentation, and loss of genetic diversity (Williams et al. 2016; NMFS 2016b).

The estimated number of adult Coho Salmon returning to the Russian River since 2000 has ranged from less than 10 to over 700 fish (Figure 4) (California Sea Grant 2021).

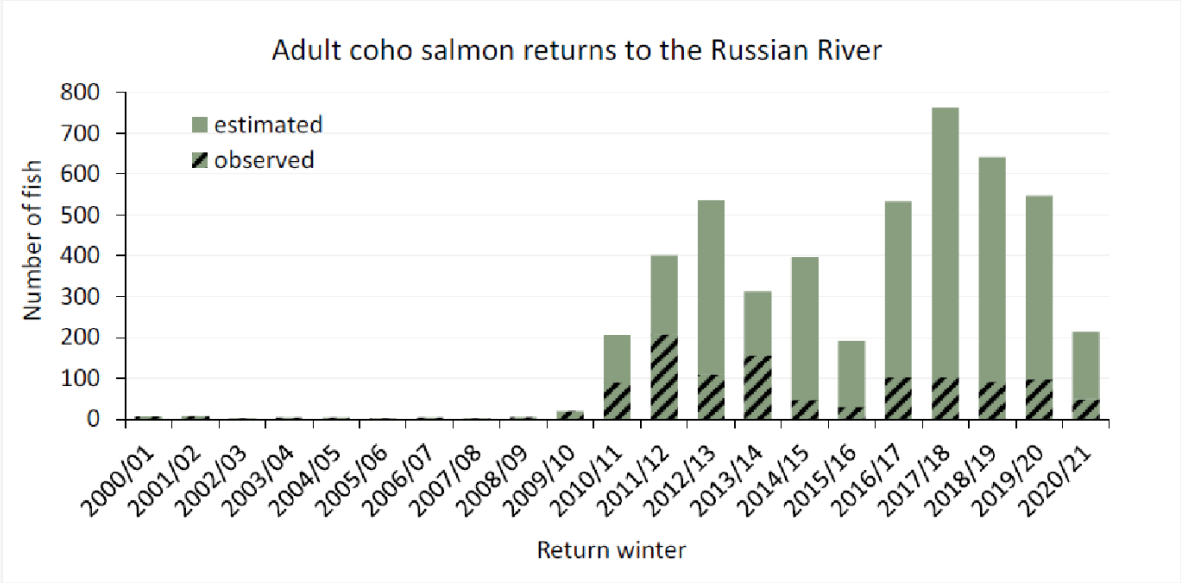
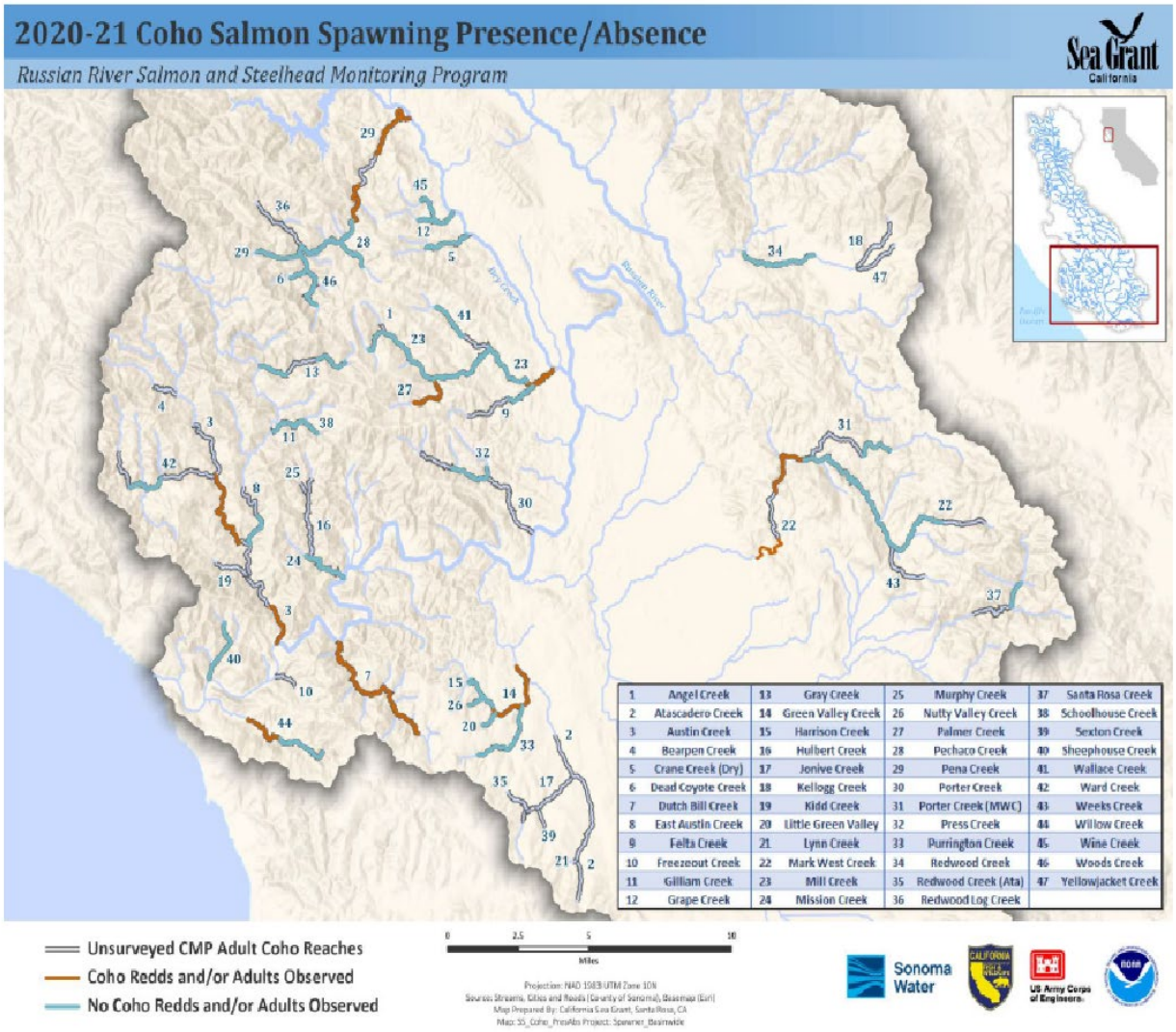


Figure 4. Estimated annual adult hatchery Coho Salmon returns to the Russian River (2000 to 2021). (California Sea Grant 2021).

Coho Salmon are found predominately in lower Russian River tributaries (Figure 5). There is little data on Coho Salmon abundance in the Upper Russian River or the East Fork Russian River where the CVFF is located. Hatchery records indicate that only a couple of HOR adult Coho have been captured at CVFF.

The number of NOR Coho Salmon smolts produced in Dry Creek and Mill Creek (tributary of Dry Creek) are shown in Figure 6. Dry Creek and Mill Creek smolt production from 2015 to 2018 has ranged from 105 to 339 and 1,271 to 5,715, respectively.



1	Angel Creek	13	Gray Creek	25	Murphy Creek	37	Santa Rosa Creek
2	Atascadero Creek	14	Green Valley Creek	26	Nutty Valley Creek	38	Schoolhouse Creek
3	Austin Creek	15	Harrison Creek	27	Palmer Creek	39	Sexton Creek
4	Bearpen Creek	16	Hulbert Creek	28	Pechaco Creek	40	Sheephouse Creek
5	Crane Creek (Dry)	17	Jonive Creek	29	Pena Creek	41	Wallace Creek
6	Dead Coyote Creek	18	Kellogg Creek	30	Porter Creek	42	Ward Creek
7	Dutch Bill Creek	19	Kidd Creek	31	Porter Creek (MWC)	43	Weeks Creek
8	East Austin Creek	20	Little Green Valley	32	Press Creek	44	Willow Creek
9	Felta Creek	21	Lynn Creek	33	Purrington Creek	45	Wine Creek
10	Freezeout Creek	22	Mark West Creek	34	Redwood Creek	46	Woods Creek
11	Gilliam Creek	23	Mill Creek	35	Redwood Creek (Ata)	47	Yellowjacket Creek
12	Grape Creek	24	Mission Creek	36	Redwood Log Creek		

Figure 5. Spawner survey reaches where Coho Salmon redds and/or adults were observed, winter 2020/2021 (California Sea Grant 2021).

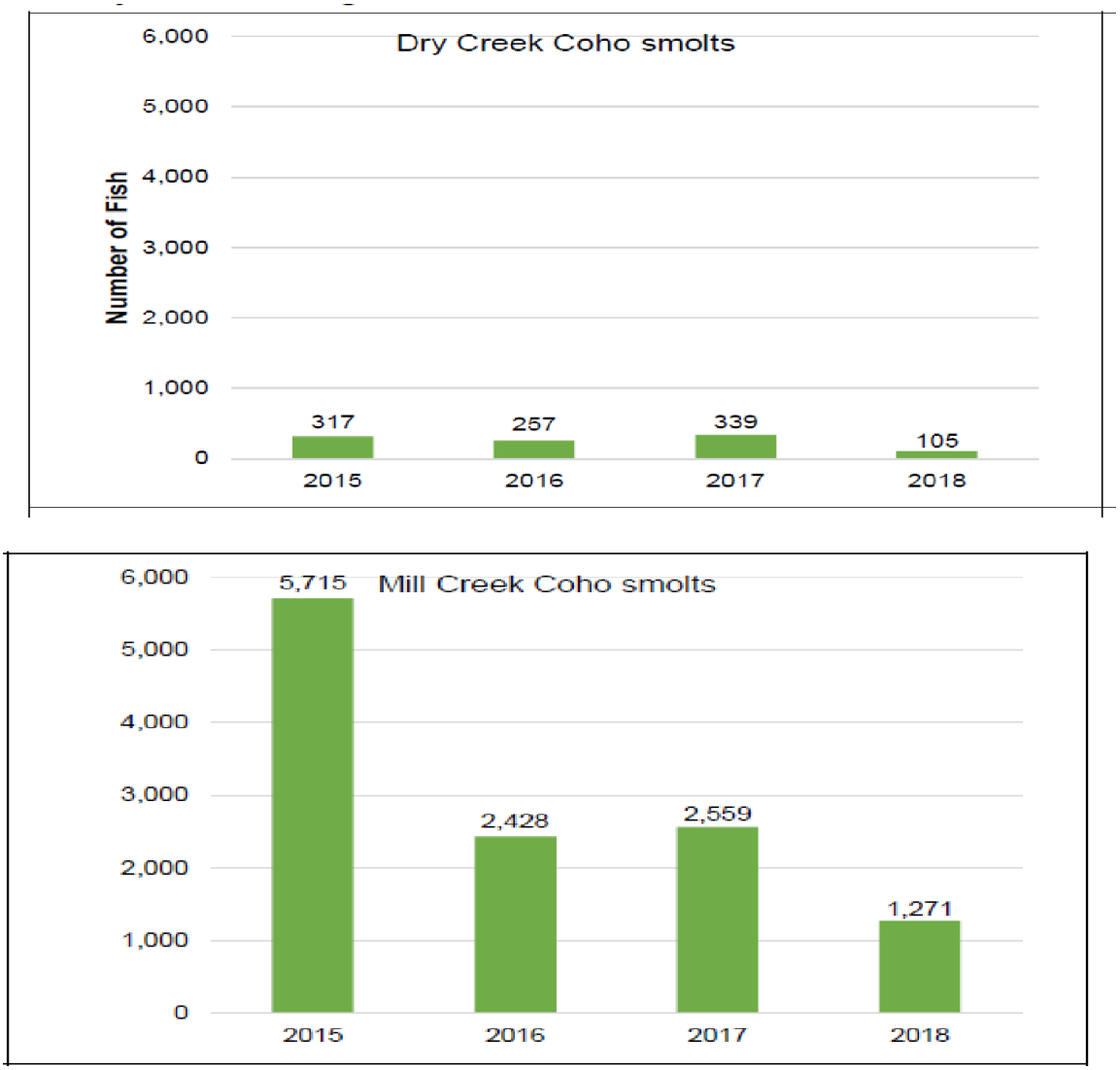


Figure 6. The estimated number of CCC Coho Salmon natural origin smolts for Dry Creek and Mill Creek (2015 – 2018). (Sonoma Water and California Sea Grant (2019).

3.3.3 California Coastal (CC) Chinook

The California Coastal (CC) Chinook ESU was originally listed as threatened under the ESA in 1999 (64 FR 50394). The following factors led to this determination: 1) overfishing, 2) habitat loss, and 3) poor ocean conditions. The most recent status review (NMFS 2016a) reaffirmed the endangered status for the species, finding a "lack of compelling evidence to suggest that the status of these populations has improved or deteriorated appreciably since the previous status review." On September 2, 2005, Critical Habitat was designated for this species (70 FR 52488); these habitats overlap with those found in the Project Area.

Although there is some debate over whether Chinook salmon inhabited the Russian River historically, local tribes reportedly harvested Chinook salmon regularly in the upper portions of

the East Fork drainage prior to the 1958 construction of Coyote Valley Dam (NMFS 2001). Chinook salmon of hatchery origin were planted in the watershed sporadically during the 1970s and nearly every year between 1982 and 1998. The total run of natural-origin Chinook salmon in the basin was believed to be relatively small.

Underwater video monitoring at the Mirabel Inflatable Dam has provided most of the data on adult Chinook salmon abundance in the Russian River since 2000 (Figure 7) (https://www.sonomawater.org/mirabel).

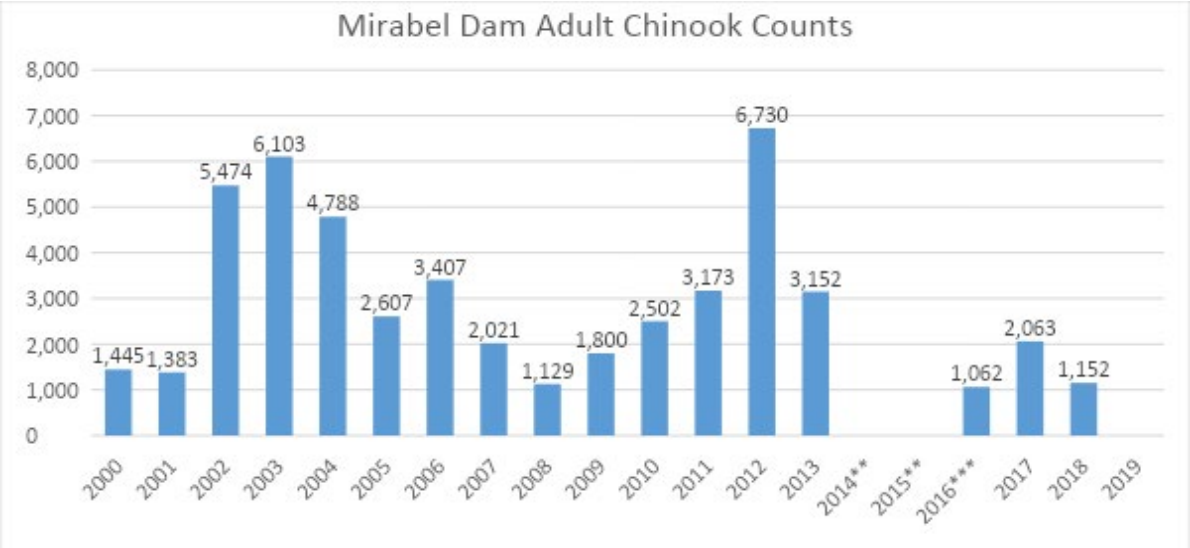


Figure 7. Mirabel Dam adult Chinook counts (2000 to 2018). The video counting system was not operational in 2014 and 2015 due to construction activities. Only one camera operated in 2016. (Sonoma Water and California Sea Grant 2019).

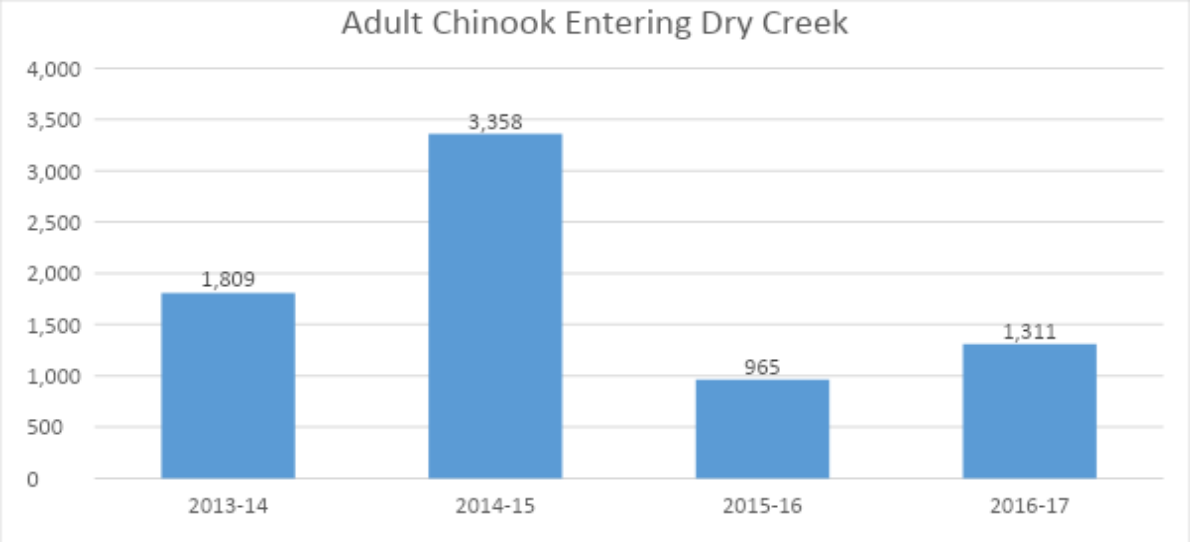


Figure 8. The estimated number of adult Chinook salmon entering Dry Creek from 2013-14 to 2016-17 (CMP Data File, 2020).

3.4 Other Fish Species

Various fish species in the action area have a relationship with salmon as competitors, prey, or predators (Table 5). Many fish species in the action area compete for food and space with salmon; as juveniles they may act as prey for salmon and as adults they may act as predators. Fish species known to occur in the action area that may prey on or compete with Coho Salmon include: Brown Bullhead (*Ictalurus nebulosus*), Bluegill (*Lepomis macrochirus*), Monterey Roach (*Hesperoleucus venustus subditus*), Coastrange Sculpin (*Cottus aleuticus*), Green Sunfish (*Lepomis cyanellus*), Golden Shiner (*Notemigonus crysoleucas*), Hardhead Catfish (*Ariopsis felis*), Largemouth Bass (*Micropterus salmoides)*, Russian River Tule Perch (*Hysterocarpus traskii pomo*), Pacific Lamprey (*Entosphenus tridentatus*), sculpins (*Cottus species*), Sacramento Sucker (*Catostomus occidentalis*), Smallmouth Bass (*Micropterus dolomieu),* Speckled Dace (*Rhinichthys osculus*), and Striped Bass (*Morone saxatilis*).

While specific habitat preferences vary greatly across species, the geographic range, or distribution, of many of the native species overlaps with steelhead in the action area, thus many of these species may be affected by current and future hatchery operations. Several of the fish species have been introduced to regional streams (Table 5); their distributions are limited to a few basins with most only occurring in the San Lorenzo River watershed.

The Tidewater Goby (*Eucyclogobius newberryi*) is a small native species that resides in estuarine environments and is listed as endangered under the ESA (59 FR 5494, February 4, 1994) with Critical Habitat designated on February 6, 2013 (78 FR 8745). The Russian River was not included in the Critical Habitat area established for this species. Tidewater Goby are administered under the ESA by the United States Fish and Wildlife Service (USFWS).

Green sturgeons are listed as a threatened species under the ESA (71 FR 17757; April 7, 2006) and Critical Habitat was designated on October 9, 2009 (74 FR 52300). Because these habitats do not overlap with those found in the Action Area, and the presence of green sturgeon in the Action Area is highly unlikely, this species will not be discussed further in this analysis.

Table 5. Species, status, habitats utilized, and anticipated interactions with CCC steelhead in the action area.

Species	Federal and State Listing Status*	Habitat Type	Type of Interaction with Salmon
American Shad, Threadfin Shad	None	Freshwater rivers to spawn. Adults occur in estuaries, bays, and coastal river areas	• Potential prey item for adult salmon
Black Bullhead	None	Utilize lower gradient rivers	• Predator of salmon eggs and fry

Species	Federal and State Listing Status*	Habitat Type	Type of Interaction with Salmon
Black Crappie, White Crappie	None	Utilize lower gradient rivers and warmer water habitats	• Potential predator of juvenile salmon
Bluegill	None	Utilize lower gradient rivers and warmer water habitats	• Potential predator of juvenile salmon
California Roach	CDFW - Species of special concern	Utilize lower gradient rivers. Can occupy large pools as well as shallow water habitats.	• Potential prey item for adult salmon • May compete with salmon for food
Channel Catfish	None	Utilize lower gradient rivers and warmer water habitats	• Potential predator of juvenile salmon
Coastrange Sculpin, Prickly Sculpin, Riffle Sculpin	None	Associated riffle habitat in smaller rivers and tributaries.	• Predator of salmon eggs and fry • Potential prey item for adult salmon • May compete with salmon for food and space • May benefit from carcasses of hatchery origin fish
Common Carp	None	Utilize lower gradient rivers and warmer water habitats	• Potential prey item for adult salmon
Fathead minnow	None	Utilize slow moving waters	• Potential prey item for adult salmon • May compete with salmon for food and space
Golden Shiner	None	Utilize slow moving streams with dense aquatic vegetation	• May compete with salmon for food and space
Goldfish	None	Utilize lower gradient rivers and warmer water habitats	• May compete with salmon for food and space
Green Sturgeon	ESA - Threatened	Utilize larger rivers to spawn in deep fast water. Early life stage may rear in freshwater up to two years.	• May compete with salmon for food • May benefit from carcasses of hatchery origin fish

Species	Federal and State Listing Status*	Habitat Type	Type of Interaction with Salmon
Green Sunfish, Redear Sunfish	None	Utilize lower gradient rivers and warmer water habitats	• Potential predator of juvenile salmon
Longfin Smelt	CESA - Threatened	Utilize freshwater rivers to spawn. Adults occur in estuaries, bays, and coastal areas	• Prey for juvenile adult salmon • May compete with salmon for food • May benefit from carcasses of hatchery origin fish
Hardhead Catfish	CDFW - Species of special concern	Utilize low- to mid-elevation well-oxygenated streams with deep pools and low-velocity run habitat. Often absent from streams where introduced sunfish predominate	• Potential predator of salmon eggs, fry and juveniles
Largemouth Bass, Smallmouth Bass, Striped Bass	None	Utilize lower gradient rivers and warmer water habitats	• Potential predator of juvenile salmon
Mosquito Fish	None	Utilize shallow, slow-moving water	• Potential prey item for adult salmon
Pacific Lamprey, Pacific Brook Lamprey	Pacific Lamprey: ESA - Species of concern Pacific Brook Lamprey: None		• Predator of salmon eggs and fry • Potential prey item for adult salmon • May compete with salmon for food and space • May benefit from carcasses of hatchery origin fish
Sacramento Blackfish	None	Utilize lower gradient rivers and warm water	• May compete with salmon for food and space
Sacramento Sucker	None	Utilize lower gradient rivers and warmer water habitats	• Potential predator of salmon eggs and fry • Potential prey item for salmon • May compete with salmon for food and space

Species	Federal and State Listing Status*	Habitat Type	Type of Interaction with Salmon
Sacramento Pikeminnow	None	Utilize lower gradient rivers and warmer water habitats	• Potential predator of salmon eggs, fry and juveniles • Potential prey items for salmon • May compete with salmon for food and space
Threadfin Shad	None	Utilize moderate moving waters, at mid column depths	• May compete with juvenile salmon for food and space • Potential prey item for salmon
Threespine Stickleback	None	Utilize slow moving waters with emerging vegetation	• May compete with juvenile salmon for food and space • Potential prey item for salmon • May benefit from carcasses of hatchery origin fish
Tidewater Goby	ESA - Endangered	Utilize shallow, slow moving, brackish water	• Potential prey items for salmon • May compete with juvenile salmon for food and space
Russian River Tule Perch	CDFW - Species of special concern	Associated with the mainstem Russian River and the lower reaches of larger tributaries with abundant cover elements	• May compete with juvenile salmon for food and space
White Catfish	None	Utilizes lower gradient rivers and streams and prefers mud-bottom pools	• Potential predator of juvenile salmon • May compete with juvenile salmon for food and space
California Perch	None	Associated with the mainstem Russian River and the lower reaches of larger tributaries with abundant cover elements	• May compete with juvenile salmon for food and space

Sources: NOAA's species webpage. Available at https://www.fisheries.noaa.gov/find-species; California Department of Fish and Wildlife Fish Species of Special Concern. Available at https://www.wildlife.ca.gov/Conservation/SSC/Fishes; University of California, Division of Agriculture and Natural Resources California Fish Website. Available at https;//calfishapp.wfcb.ucdavis.edu

3.5 Wildlife

The action area supports a variety of birds, mammals, amphibians, and invertebrates that may eat salmon, compete with salmon for food and space, and/or scavenge on salmon (throughout their different life stages) (Table 6). Predators of salmon include many bird species, amphibians, and marine and terrestrial mammals. Eagles, cormorants, and ospreys also scavenge on salmon carcasses. Other wildlife species compete with salmon and steelhead for food and/or habitat. Salmon currently produced by the DCFH program are a food source for various wildlife species. Wildlife species in the Action Area also feed on salmon carcasses and subsequently bring marine derived nutrients from salmon into the terrestrial ecosystem through nutrient cycling.

The California freshwater shrimp (*Syncaris pacifica)* is a listed species at both the state and federal level (53 FR 43884). This invertebrate can be found in streams located in the lower Russian River. The shrimp prefers low elevation (less than 116 meters (380 ft.), low gradient (<1%) perennial or intermittent streams with perennial pools with structurally diverse habitat. According to the recovery plan for the species, hatchery production of salmonids was not listed as a threat to this species (USFWS 1998). For this reason, no further discussion will be provided on this species.

The California tiger salamander (*Ambystoma californiense*) is a listed species at both the state and Federal level. This species is not found in the Action Area and is therefore not covered in the EA.

The fisher (*Pekania pennanti)* is a candidate species for listing under the CESA. While the fisher's habitat overlaps somewhat with the Action Area, this species rarely eats fish and prefers heavily wooded areas; therefore, this species will not be discussed further in this analysis.

Table 6. Status and habitat of wildlife in the action area with indirect or direct relationships with hatchery-origin salmon and steelhead.

Species	Federal and State Listing Status*	Habitat	Type of Interaction with Salmon
California freshwater shrimp	ESA - Endangered CESA - Endangered	● Freshwater	● Potential prey item for adult salmon
California tiger salamander	ESA -Endangered CESA -Threatened	● Freshwater	● Potential prey item for adult salmon
California red-legged frog	ESA -Threatened CDFW - Species of special concern	● Freshwater	● Potential prey item for adult salmon
California giant salamander	CDFW - Species of special concern	● Freshwater	● Potential prey item for adult salmon

Species	Federal and State Listing Status*	Habitat	Type of Interaction with Salmon
Foothill yellow-legged frog	CDFW - Species of special concern	• Freshwater	• Potential prey item for adult salmon
Western pond turtle	CDFW - Species of special concern	• Freshwater	• Potential predator of salmon eggs and fry • Potential prey item for salmon • May compete with salmon for food and space
Ducks, geese, and swans	None	• Freshwater • Marine • Estuary	• Potential predator of salmon eggs and fry
Gulls and terns	None	• Freshwater • Marine • Estuary	• Potential predator of salmon eggs and fry
Great egret	CDFW - Special animal	• Freshwater • Estuary	• May compete with juvenile salmon for food and space
Great blue heron	CDFW - Special animal	• Freshwater • Estuary	• Potential predator of salmon eggs and fry
Bald eagle	ESA - Delisted CESA - Endangered CDFW - Fully protected CDF - Sensitive	• Freshwater • Marine • Estuary	• Potential predator of salmon eggs, fry and juveniles • Potential scavenger of adult salmon carcasses
Golden eagle	CDFW - Fully Protected CDFW - Sensitive	• Freshwater • Marine • Estuary	• Potential predator of salmon eggs, fry and juveniles • Potential scavenger of adult salmon carcasses
Double-crested cormorant	CDFW - Special animal	• Freshwater • Marine • Estuary	• Potential predator of salmon eggs, fry and juveniles • Potential scavenger of adult salmon carcasses
Osprey	CDFW - Special animal	• Freshwater • Estuary	• Potential predator of salmon eggs, fry and juveniles • Potential scavenger of adult salmon carcasses
American white pelican	CDFW - Species of special concern CDFW - Fully Protected	• Freshwater • Marine • Estuary	• Potential predator of salmon eggs, fry and juveniles

Species	Federal and State Listing Status*	Habitat	Type of Interaction with Salmon
California brown pelican	CESA - Endangered	• Marine • Estuary	• Potential predator of salmon eggs, fry and juveniles
American black bear	None	• Freshwater	• Potential predator of salmon eggs, fry and juveniles • Potential scavenger of adult salmon carcasses
River otter	None	• Freshwater • Marine • Estuary	• Potential predator of salmon eggs, fry and juveniles
Racoons	None	• Freshwater	• Potential predator of salmon eggs, fry and juveniles
Fisher	CESA - Candidate species	• Freshwater	• Potential predator of salmon eggs, fry and juveniles • Potential scavenger of adult salmon carcasses
Harbor seal	MMPA	• Marine • Estuary	• Potential predator of salmon eggs, fry and juveniles
California sea lion	MMPA	• Marine • Estuary	• Potential predator of salmon eggs, fry and juveniles

*Endangered Species Act (ESA), California Endangered Species Act (CESA), California Department of Fish and Wildlife (CDFW), and Marine Mammal Protection Act. Sources: NOAA's species webpage. Available at https://www.fisheries.noaa.gov/find-species; California Department of Fish and Wildlife, California Natural Diversity Database, special animal list. Available at https://www.wildlife.ca.gov/Conservation/SSC

3.6 Cultural Resources

Salmon represents an important cultural resource to many Native American tribes. It is a core symbol of tribal identity, individual identity, and the ability of many Native American cultures to endure (NMFS 2005). The survival and well-being of salmon is seen as inextricably linked to the survival and well-being of Native American people and the cultures of the tribes (NMFS 2005).

There are 14 Federally recognized tribes within the Action Area:

1. Chicken Ranch Rancheria of Me-wuk Indians of California
2. Cloverdale Rancheria of Pomo Indians of California
3. Coyote Valley Band of Pomo Indians of California
4. Dry Creek Rancheria Band of Pomo Indians, California
5. Federated Indians of Graton Rancheria
6. Hopland Band of Pomo Indians, California
7. Kashia Band of Pomo Indians of the Stewarts Point Rancheria, California
8. Koi Nation of Northern California
9. Lytton Rancheria of California
10. Manchester Band of Pomo Indians of the Manchester Rancheria, California

11. Pinoleville Pomo Nation, California
12. Potter Valley Tribe, California
13. Redwood Valley or Little River Band of Pomo Indians of the Redwood Valley Rancheria California
14. Robinson Rancheria Band of Pomo Indians, California.

The tribes identified above do not have Federal fishing rights for water bodies within the Action Area (Figure 1). The Dry Creek Rancheria Band of Pomo Indians has Federally recognized land that is located adjacent to the DCFH. Currently, efforts associated with the hatchery program utilize existing roadways, avoid sacred burial sites and other culturally important access areas.

4 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

The environmental consequences section forms the scientific and analytic basis for comparing alternatives, determining the effects of the alternative on the environment as well as the degree of each effect. The effects can be beneficial or adverse to man's environment and the maintenance and enhancement of long-term productivity.

The significance of the effect is determined by the degree to which the actions adversely or beneficially effect the affected environment's resources. To evaluate each alternative's potential environmental consequences on the affected environment, actions and effects must be placed in context of the Affected Environment, and an estimation of the probability of occurrence, degree or intensity, and duration of the effects must be made.

The degree of effect is described using the following terms:

- No Effect: No beneficial or adverse effect
- Undetectable: The effects would not be detectable.
- Negligible: Beneficial or adverse effects would be at the lower levels of detection.
- Low: Beneficial or adverse effects would be slight
- Moderate: Beneficial or adverse effects would be measurable with low statistical power[6]
- High: Beneficial or adverse effects would be measurable with high statistical power[7]

[6] Low statistical power means that a monitoring program designed to measure the effect would have a small chance of detecting a true effect as the results can be heavily influence by random or systematic error.

[7] High statistical power means that results from a monitoring program designed to measure the effect are likely valid.

The duration of the effect is described using two terms:

- Short-term: The effect would be for less than 10-years.
- Long-term: The effect would be for 10-years or more.

The 10-year time frame was chosen for distinguishing duration periods as this is the length of time the permit would be in force.

In this section, the probable effects each alternative has on the environmental resources of the Project Area are discussed.

A summary of the degree of effects by resource area is provided for each alternative in Table 7. The rationale for each effect classification is provided by resource area below.

4.2 Effects from Alternative 1 (No Action – No Production)

Under Alternative 1 (No Action – No Production), NMFS would determine that the submitted permit application fails to meet the criteria necessary to issue an ESA section 10(a)(1)(A) permit, and NMFS would not issue the ESA section 10(a)(1)(A) permit to the USACE. The alternative assumes that the USACE would cease all hatchery production of CCC steelhead at both DCFH and CVFF. The adverse and beneficial effects to Russian River resources from the implementation of this alternative are discussed below.

4.2.1 Water Resources

The effects to water quantity and water quality from ceasing steelhead hatchery production are discussed in this section of the EA.

4.2.1.1 Water Quantity

Under Alternative 1 (No Action – No Production), there would likely be a small reduction in the quantity of water required for hatchery operations at DCFH. The decrease in water requirements would be dependent on the flow needed to maintain the CCC Coho Salmon program at this facility and future operations (NMFS 2020a and 2020b).

Hatchery production is considered a non-consumptive water use. The amount of water entering the facility is generally equal to that leaving the facility. Water loss can occur due to evaporation and leakage of system water piping which are both minor. This level of water loss does not have a significant effect on hydrologic conditions and biological resources of Dry Creek. Therefore, the elimination of this water loss from terminating hatchery operations for this alternative is rated as negligible beneficial.

Table 7. Summary of effects on resources under each Alternative.

Resource	Metric	Alternative 1 (No Action - No Production)	Alternative 2 (No Action - Status Quo Production)	Alternative 3 (Proposed Action)
Water Resources	Quantity	Negligible Beneficial	Negligible Adverse	Negligible Adverse
	Quality	Negligible Beneficial	Negligible Adverse	Negligible Adverse
CCC Steelhead	Overall	High Adverse	Moderate Adverse	Moderate Beneficial
	Population	High Adverse	Moderate Beneficial	Moderate Beneficial
	Genetic	High Beneficial	High Adverse	Moderate Adverse
	Ecological	Low Beneficial	Low Adverse	Low Adverse
CCC Coho Salmon	Overall	Moderate Beneficial	High Adverse	Low Adverse
	Population	Moderate Beneficial	Moderate Adverse	Low Adverse
	Genetic	Not Applicable	Not Applicable	Not Applicable
	Ecological	Moderate Beneficial	High Adverse	Negligible Adverse
CC Chinook	Overall	Negligible Beneficial	Negligible Adverse	Negligible Adverse
	Population	Negligible Beneficial	Negligible Adverse	Negligible Adverse
	Genetic	Not Applicable	Not Applicable	Not Applicable
	Ecological	Low Beneficial	Negligible Adverse	Negligible Adverse
Other Fish Species	Competing with Salmon	Negligible Beneficial	Negligible Adverse	Negligible Adverse
	Predators of Salmon	Negligible Adverse	Negligible Beneficial	Negligible Beneficial
Wildlife	Predators of Salmon	Negligible Adverse	Negligible Beneficial	Negligible Beneficial
Cultural Resources	All Aspects	Moderate Adverse	Negligible Beneficial	Negligible Adverse
Recreational Fisheries (Harvest)	All Aspects	High Adverse	High Beneficial	High Beneficial

The elimination of steelhead production at CVFF would likely have a negligible beneficial effect on water quantity in the East Fork Russian River.[8] Water used to rear fish at CVFF is discharged directly back to the East Fork Russian River with only minor losses in water quantity due to evaporation and infrequent leakages from water supply pipes.

4.2.1.1 Water Quality

Under Alternative 1 (No Action – No Production), the characteristics of water discharge from DCFH and CVFF are not likely to change. The elimination of the steelhead program would reduce the total amount of pollutants produced at both facilities. However, the discharge from the two facilities is regulated by the National Pollutant Discharge Elimination System (NPDES) permit #CA0024350/I.D. No. 1B84034050N which is designed to protect the water quality and aquatic resources of the streams (Table 1). Therefore, the effect on water quality from the implementation of this alternative is expected to be negligible beneficial.

4.2.2 Salmon and Steelhead

If NMFS determines to not issue an ESA section 10(a)(1)(A) permit to the USACE to maintain steelhead production, Program operations would cease until a new permit application is submitted, and the applicants are granted an ESA section 10(a)(1)(A) permit. Without the Program, all potential beneficial or adverse effects of the Program on biological resources, as discussed below, would be eliminated, or reduced long-term (e.g., genetic effects to natural origin steelhead).

4.2.2.1 Central California Coast (CCC) Steelhead

It is reasonably likely that CCC steelhead will face high adverse effects if the USACE is not issued an ESA section 10(a)(1)(A) permit as described under Alternative 1 (No Action – No Production). These adverse effects will be realized primarily from a decrease in NOR adult and juvenile CCC steelhead abundance in the Russian River basin during the term of the permit (10-years).

Population Effects

The termination of the steelhead hatchery program in Alternative 1 (No Action – No Production) would result in a substantial decrease in the number of adult steelhead returning to the basin. From 2006 to 2017, the total number of fish returning to hatchery facilities has ranged from 1,241 to 10,462 and averaged 5,820 steelhead. (Figure 8). Under this alternative, total steelhead production would be reduced by a similar amount because the Program would be eliminated.

[8] The EA assumes that the USACE will not transfer production from the Coho Salmon at DCFH program to CVFF.

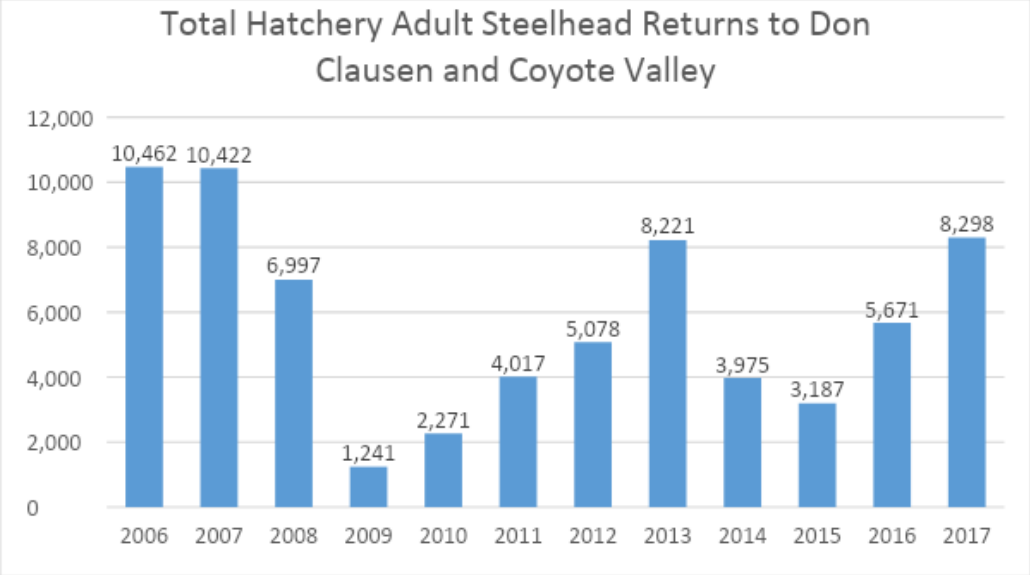


Figure 8. The number of adult hatchery steelhead returning to DCFH and CVFF from 2006 to 2017.

The numbers presented in Figure 8 are a minimum estimate of the number of HOR steelhead returning to the basin as many HOR adults spawn naturally in Russian River tributaries. Data presented in Appendix A of the HGMP (USACE and CDFW 2021) indicate that based on modeling, there could be an additional 2,000 to 4,000 HOR steelhead spawning naturally in the system (USACE and CDFW 2021). These hatchery fish are classified as "strays" as they did not return to the hatchery where they were released (Table 4, Table 8).

The proportion of the natural spawning population consisting of stray HOR steelhead (pHOS) in the Russian River has been estimated at 49%, for all streams combined (Table 8). The value is based on adult spawning surveys conducted from 2015 to 2018.

HOR steelhead adults spawning naturally can interbreed with NOR steelhead. This breeding can in turn reduce the genetic fitness of resulting offspring and the productivity and abundance of the NOR component of the population (HSRG 2014). The severity of the effect is estimated by calculating the proportionate natural influence value (PNI) for the Program.

PNI is calculated as follows:

PNI = pNOB/ (pNOB + pHOS)

Wherein:

pHOS = the proportion of the natural spawning population consisting of HOR adults, and

pNOB = the proportion of the hatchery spawned population consisting of NOR adults.

PNI values > 0.50 indicate that the genetic fitness of the composite population (HOR + NOR) is being driven by the natural environment, values < 0.50 by the hatchery environment. A fully fit

natural population has no hatchery influence and therefore has a PNI of 1.0. Such a population exhibits the highest level of productivity and abundance possible for the environmental conditions present in the stream. The HSRG (2014) recommends that for biologically important populations (e.g., ESA listed) that PNI be >0.67.

The PNI value for current hatchery operations is estimated at 0.27 (USACE and CDFW 2021). Therefore, the low PNI value indicates that population fitness is being driven by the hatchery environment, rather than the natural environment. Thus, the productivity and abundance of fish spawning naturally is less than the potential of the stream's habitat to produce fish.

The termination of the Program under Alternative 1 (No Action – No Production) will eliminate hatchery caused negative genetic effects to the NOR population, resulting in increased population fitness and fish abundance over the long term. However, it will require many generations before a PNI value of 1.0 can be achieved (Figure 9). At that point in time, adult NOR abundance is theorized to have increased from approximately 4,200 to 8,700 fish if environmental conditions remain static (i.e., no increase or decrease in habitat quality and quantity).

Although NOR steelhead abundance is expected to increase long - term from Program termination in Alternative 1 (No Action – No Production), it is also expected that over a few generations (~11 generations) NOR abundance could drop from 4,200 to 700 adults (Figure 9). The decrease in adult steelhead production occurs because:

1) HOR fish will no longer spawn naturally and their offspring will not contribute to total natural production[9], and
2) The genetic fitness of the remaining NOR production has been reduced due to hatchery fish spawning naturally in the Russian River since Program inception. These remaining NOR steelhead are likely poorly adapted to the natural environment and thus their reproductive success in nature has decreased to the point where the population may not be sustainable without supplementation with hatchery fish.

Overall, these two outcomes increase the risk that CCC steelhead could be extirpated from the Russia River basin under Alternative 1 (No Action – No Production). The degree of effect to CCC steelhead from Program termination is therefore rated as high adverse.

[9] Hatchery origin adults spawning naturally produce natural origin juveniles. However, because of the decreased genetic fitness of hatchery fish the number of juveniles produced is insufficient to maintain the population. For example, for every 100 hatchery adults spawning naturally the resulting natural juvenile production might only result in the return of 50 adults. Thus, natural production consisting of large numbers of hatchery fish must be constantly supplemented with HOR fish to maintain production.

Table 8. Index of steelhead pHOS for Russian River tributaries (2015-2018) (USACE and CDFW 2021).

Stream	Survey Year			
	2015/2016	2016/2017	2017/2018	Average
Austin Creek	33%		100%	67%
East Austin Creek			33%	33%
Bear Pen Creek			0%	0%
Big Sulphur Creek			54%	54%
Crane Creek			50%	50%
Duncan Creek			100%	100%
Dutch Bill Creek	50%	57%	100%	69%
Felta Creek		100%		100%
Forsythe Creek			0%	0%
Grape Creek	76%	50%		63%
Gray Creek		0%		0%
Green Valley Creek		33%	0%	17%
Hulbert Creek	67%	71%	100%	79%
Mark West Creek	50%	20%	50%	40%
Mill Creek	88%	43%	60%	63%
Pena Creek	77%	57%	54%	63%
Pechaco Creek		56%		56%
Pieta Creek			67%	67%
Porter Creek	67%	74%	0%	47%
Purrington Creek	25%	0%		13%
Redwood Creek	100%	50%		75%
Santa Rosa Creek		0%		0%
Wine Creek	86%	30%		58%
Woods Creek	100%	80%	25%	68%
Average	**68%**	**45%**	**50%**	**49%**

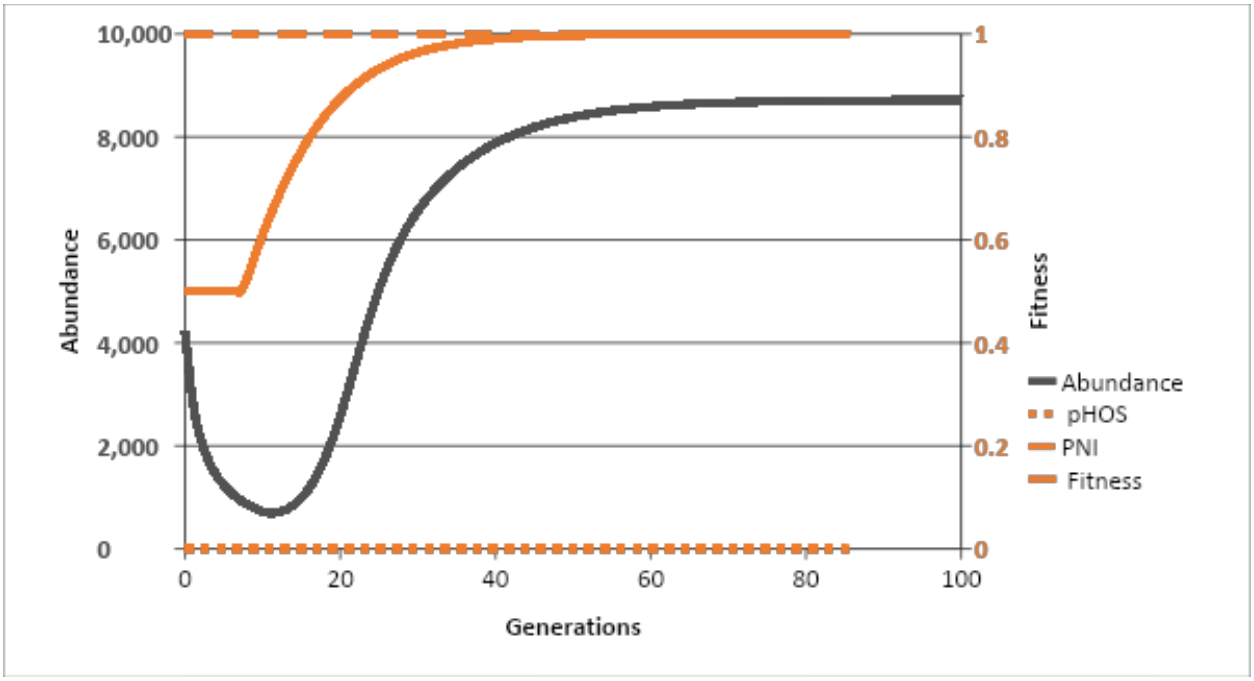


Figure 9. Theorized change in PNI and adult abundance over 100 steelhead generations (5-years per generation) with the elimination of the hatchery steelhead program. The analysis uses adult productivity and capacity values from Appendix A of the HGMP (USACE and CDFW 2021).

Ecological Effects

The ecological effects of the Program to steelhead occur primarily through the mechanisms of competition, predation, and disease. Competition between HOR and NOR steelhead for limited resources may occur when large numbers of hatchery fish are released into the natural environment. The released fish may also prey on natural origin fish resulting in a decrease in natural production. Both hatchery operations and fish releases may increase disease risk to naturally produced steelhead that could reduce natural fish abundance.

Hatchery steelhead will no longer be released to the Russian River in Alternative 1 (No Action – No Production). This outcome will eliminate all competition, predation, and disease effects the recent hatchery Program (Alternative 2 (No Action – Status Quo Production)) may have on steelhead, as well as other species such as Coho Salmon and Chinook.

The HGMP used the PCDRISK model (Pearsons and Busack 2011) to develop an Index of Ecological Risk that hatchery steelhead production poses to NOR Russian River steelhead populations (USACE and CDFW 2021). Based on a scale of 0-100%, the Index of Ecological Risk for the recent Program (Alternative 2 (No Action – Status Quo)) to steelhead ranged from 3.5% to 14.7% (i.e., relatively low risk).[10] The termination of the Program under Alternative 1

[10] The Index value range from 0-100%, with a score of 100% implying the Program being modeled may have severe effects to the natural population.

(No Action – No Production) would therefore likely have a low beneficial effect on NOR steelhead due to the elimination of these ecological effects (i.e., Index Value of 0%).

However, the elimination of the Program would result in negligible adverse effects to CCC steelhead due to a decrease in steelhead carcasses that provide marine-derived nutrients that enhance basin productivity.

4.2.2.2 Central California Coast (CCC) Coho Salmon

If the USACE is not issued an ESA section 10(a)(1)(A) permit as described under Alternative 1 (No Action – No Production), the degree of effects to Coho Salmon will likely be moderate beneficial. This outcome results from the elimination of the ecological effects hatchery production of steelhead may have on this species. This in turn is likely to increase Coho Salmon juvenile abundance and eventually adult abundance of Coho Salmon.

The Index of Ecological Risk of the current (Pre-2020, Alternative 2 (No Action - Status Quo Production) Program to Coho Salmon ranged from 4.2% to 99.0%. Again, the index value was developed based on PCDRISK modeling (USACE and CDFW 2021). The Index of Ecological Risk decreases to zero under Alternative 1 (No Action – No Production).

Hatchery steelhead pose the highest risk to Coho Salmon juveniles as this life stage is susceptible to predation by the larger HOR yearling steelhead. This risk is exacerbated by the large number of HOR steelhead released in Alternative 2 (No Action – Status Quo Production) to the Russian River, and especially Dry Creek.

The past release of up to 300,000 HOR steelhead from DCFH to Dry Creek is especially concerning as this stream produces relatively large numbers of endangered Coho Salmon and is one of the subbasins stocked with hatchery Coho Salmon from the Russian River Coho Salmon Captive Broodstock Program (CDFW and USACE 2017). The degree of effect to Dry Creek Coho Salmon from eliminating hatchery production under this alternative would be high beneficial.

Although naturally produced Coho Salmon are not present in the East Fork Russian River, HOR steelhead released from CVFF migrate to the lower Russian River where they likely prey on, and compete with, Coho Salmon using the lower river for rearing and migration. However, in contrast to DCFH, CVFF HOR steelhead must migrate through the entire length of the much larger Russian River to the ocean, resulting in lower steelhead to Coho Salmon juvenile density ratios, and thus decreased predation.

Additionally, the elimination of steelhead hatchery production under Alternative 1 (No Action – No Production) would result in low adverse effects to CCC Coho Salmon due to a decrease in steelhead carcasses that provide marine-derived nutrients and a reduction in eggs and juveniles this species may use as a food source.

4.2.2.3 California Coastal (CC) Chinook Salmon

If the USACE is not issued an ESA section 10(a)(1)(A) permit as described under Alternative 1 (No Action – No Production), the degree of effect to Chinook salmon will be negligible

beneficial. This results from the elimination of the ecological effects (predation, competition, and disease) the Program may have on this species. This in turn is likely to increase Chinook salmon juvenile abundance and eventually adult abundance. However, the ability to detect a change in abundance for each life stage is at the low end of detectability for juveniles and not detectable for adults.

PCDRISK modeling produced an Index of Ecological risk score for Chinook salmon that ranged from 2.4% (CVFF) to 6.2% (DCFH) for past hatchery practices and production (Alternative 2 (No Action – Status Quo Production)). The index was higher for DCFH HOR steelhead releases as these smolts may prey on the relatively large number of Chinook juveniles inhabiting Dry Creek (USACE and CDFW 2021). In contrast, steelhead smolts from CVFF are released higher in the watershed into the East Fork Russian River, where they then migrate through the much larger Russian River to the ocean, resulting in lower steelhead to Chinook juvenile density ratios, and thus decreased predation. Thus, Alternative 1 (No Action – No Production) will eliminate (negligible beneficial) ecological risks to CC Chinook.

The elimination of the Program in this alternative would result in negligible adverse effects to CC Chinook due to a decrease in steelhead carcasses that provide marine-derived nutrients and a reduction in eggs and juveniles this species may use as a food source.

4.2.3 Other Fish Species

If steelhead hatchery production were to cease, as described under Alternative 1 (No Action – No Production), it is reasonably expected that the species identified as predators of salmon eggs, fry, and adults identified in Table 5 will likely experience negligible adverse effects from a reduction to their salmon-based food sources throughout the action area compared to other alternatives. These adverse effects will be realized through decreased abundance of steelhead eggs, fry, juveniles, and adults in the Russian River and the loss of marine derived nutrients from adult carcasses (hatchery returns or artificially placed) in the action area.

Conversely, it is also possible that fish identified in Table 5 as "competing with salmonids for food and space" may experience negligible beneficial effects due to increased availability of resources (i.e., food and habitat) from decreased competition with salmon and steelhead.

4.2.4 Wildlife

Like the description above concerning "other fish species", wildlife found in the action area that are predators of salmon adults, fry, and juvenile will likely experience some adverse effect with Program termination under Alternative 1 (No Action – No Production) (Table 6). These adverse effects are expected to occur to each of these species in the action area, but the degree of effect will be negligible adverse.

4.2.5 Cultural Resources

Effects on cultural resources typically occur when an action disrupts or destroys cultural artifacts, disrupts cultural use of natural resources, or would disrupt cultural practices. Hatchery programs have the potential to affect cultural resources if there is construction, expansion or transportation at the hatchery facilities that disrupts or destroys cultural artifacts, or if the

hatchery programs affect the ability of Native American tribes to use salmon and steelhead in their cultural practices.

Salmon represents an important cultural resource to many Native American Tribes. It is a core symbol of tribal identity, individual identity, and the ability of many Native American cultures to endure (NMFS 2005). The survival and well-being of salmon is seen as inextricably linked to the survival and well-being of Native American people and the cultures of the tribes (NMFS 2005).

In addition, Indian trust assets are legal interests in property held in trust by the United States for Indian tribes or individuals. The U.S. Secretary of the Interior, acting as the trustee, holds Indian trust assets, which may either be on or off Indian reservations. The United States, and thus Federal agencies, have a trust responsibility to protect and maintain these rights reserved by or granted to Indian Tribes or Indian individuals by treaties, statutes, and executive orders.[2] The natural or physical environment of a tribe may include resources reserved by treaty or lands held in trust; native species (*e.g.*, salmon and steelhead); sites of special cultural, religious, or archaeological importance, such as sites protected under the National Historic Preservation Act or the Native American Graves Protection and Repatriation Act; and other areas reserved for hunting, fishing, and gathering. Fishing is considered an Indian trust asset because Indian Treaties with the United States government on the West Coast guaranteed treaty tribes the right to fish.

The Program utilizes existing facilities and roadways for transportation which already avoid culturally important artifacts. Under Alternative 1 (No Action – No Production), USACE would not be issued a permit for the program as proposed, resulting in a decrease in total steelhead production in the Russian River. A decrease in adult steelhead production could reduce the number of fish available to meet tribal cultural needs. Regardless, because of the cultural importance of salmon to the tribes, and the increased risk of steelhead extirpation under this alternative, the degree of effect to cultural resources is considered moderate adverse.

4.2.6 Harvest

The termination of the Program under Alternative 1 (No Action – No Production) would result in a high adverse effect on the sport harvest of steelhead in the Russian River. According to the data in Table 4, the average annual number of HOR steelhead harvested from 2006-2015 was 648 adults. Because hatchery steelhead would no longer be released in this alternative, steelhead harvest would likely be eliminated until such time that NOR steelhead abundance increases to harvestable abundance levels. This increase in NOR steelhead abundance is not expected for decades (Figure 9).

The discontinuation of steelhead sport harvest will likely have low beneficial effects on natural steelhead abundance. The HGMP documented that on average, 579 NOR steelhead are caught and released each year, resulting in the possible loss of 58 adults due to hooking mortality (assumed 10% mortality rate on hooked fish). Since sport fisheries would likely be eliminated without a hatchery program, these 58 adults would not be lost, but they only represent about 1-2% of the total Russian River natural steelhead population. (CDFW and USACE 2021).

4.3 Alternative 2 (No Action – Status Quo Production)

Under this alternative, NMFS would determine that the submitted permit application fails to meet the criteria necessary to issue an ESA section 10(a)(1)(A) permit, and NMFS would not issue the ESA section 10(a)(1)(A) permit to the USACE. However, because the hatchery program is federally mandated to mitigate for the construction of Warm Springs and Coyote Valley dams, this alternative assumes that the Program would operate as it did pre-2020 (Status Quo). Status Quo hatchery operations and steelhead production would continue until a new permit application is submitted, and the applicants are granted an ESA section 10(a)(1)(A) permit.

The Program would rear and release a total of 500,000 yearling HOR steelhead to the Russian River basin. Of these fish, 300,000 would be released to Dry Creek and 200,000 to the east Fork Russian River. Fish size at release would be 4 fpp, or approximately twice the size of that proposed in the HGMP (8 fpp).

4.3.1 Water Resources

4.3.1.1 Water Quantity

Under Alternative 2 (No Action – Status Quo Production), there would be negligible adverse effects to water quantity in Dry Creek from DCFH operations and in the East Fork Russian River from CVFF operations as the water used for hatchery production is non-consumptive.

Water used to rear Program fish at DCFH is obtained from the stilling basin of Warm Springs Dam. Water used for fish production at this hatchery is returned to Dry Creek, where it eventually flows into the Russian River. The amount of water used for continued rearing of hatchery steelhead fish would be negligible adverse, particularly when compared to the amount of water available in Lake Sonoma (used to store and release water into Dry Creek for downstream uses), and the amount used to maintain ongoing DCFH program for CCC Coho Salmon (NMFS 2020b).

As is the case for DCFH, water use at CVFF for hatchery operations is non-consumptive and is returned to the East Fork Russian River to assist in the attainment of instream minimum flow requirements. Continuing to use water from Lake Mendocino for hatchery production of steelhead will have negligible adverse effects to the water quantity of this river.

4.3.1.2 Water Quality

Negligible adverse effects to water quality are expected at both DCFH and CVFF under Alternative 2 (No Action – Status Quo Production). The facilities would continue to operate consistent with their NPDES permit. Compliance with permit conditions is monitored through effluent sampling two times a month and the following parameters are measured: total suspended and settleable solids, pH, salinity, temperature, turbidity, and dissolved oxygen. Daily maximums for these parameters were set based on beneficial uses for Dry Creek and East Fork Russian River and are therefore not expected to result in significant effects on the receiving waters. Corrective actions would be taken by hatchery staff if maximum values of any parameters were observed so any violations would be short-term.

4.3.2 Salmon and Steelhead

4.3.2.1 Central California Coast (CCC) Steelhead DPS

The continuation of hatchery steelhead production and operations under Alternative 2 (No Action – Status Quo Production) would result in both beneficial and adverse effects to Russian River steelhead populations. These possible effects are described below.

Since the publication of the draft EA, there has been the detection of New Zealand Mud Snails (NZMS) at the DCFH and at the outlet of CVFF in 2023. The detection of NZMS has prompted CDFW's steelhead program to redouble its efforts to avoid the spread of this aquatic invasive species. NZMS can affect the growth rates of all juvenile salmonids and other wildlife that consume prey that the NZMS outcompete for habitat space. To ensure NZMS are not spread to other watersheds, steelhead outplantings continue to be limited to areas that are NZMS positive. Such actions are supported by NZMS presence confirmation surveys in advance of releases. CDFW will continue to operate consistent with all federal and state policies, including conforming to the National Pollution Discharge Elimination and Aquatic Invasive Species testing and reporting requirements. In addition, CDFW will explore eradication procedures to eliminate NZMS from all facilities as well as the waters and equipment used for transport, to broaden the list of waters eligible to receive steelhead in the future. Due to the measures taken by CDFW the effect is Negligible Adverse. The mitigation measures would occur under Alternative 2 (No Action – Status Quo Production and Alternative 3 (Proposed Action).

Population Effects

Alternative 2 (No Action - Status Quo Production) provides moderate beneficial effects to Dry Creek and Upper Russian River steelhead population abundance (Table 9). The release of hatchery juveniles at DCFH and CVFF produce an average of 975 and 1,317 returning adults that spawn naturally in both Dry Creek and the Upper Russian River, respectively. The offspring of these hatchery adults contribute to natural production in both streams. Additionally, some of the hatchery adults spawn in other tributaries which may also result in an increase in natural steelhead production (Table 8).

Although hatchery fish spawning naturally may increase natural steelhead production, they also reduce the genetic fitness (i.e., productivity) of the natural population by interbreeding. The PNI for the Dry Creek and Upper Russian River steelhead populations under Alternative 2 (No Action – Status Quo Production) is 0.1 and 0.3, respectively. PNI values below 0.5 indicate that the hatchery environment, rather than the natural environment, is driving local adaptation of the population. The overall population fitness is estimated to be 0.5, the lowest value possible for a population. Thus, Alternative 2 (No Action - Status Quo Production) results in high adverse effects to the genetic fitness of the populations where large numbers of hatchery fish are spawning naturally (Table 8). A reduction in population fitness decreases population productivity.

Table 9. Hatchery performance metrics for Alternative 2 (No Action -Status Quo Production)*. Analysis was conducted using the AHA Model (See HGMP).

Parameter	Dry Creek	Upper Russian River
NOR Natural Escapement (Adults)	452	1,159
HOR Natural Escapement (Adults)	975	1,317
Total Adult Run-size (HOR + NOR)	5,872	4,796
PNI	0.1	0.03
pHOS	0.63	0.48
Population Fitness (range 0.5 to 1.0)	0.5	0.5

*Data from Table 1 and Table 2 of the HGMP

Ecological Effects

The ecological risk the implementation of Alternative 2 (No Action - Status Quo Production) poses to CCC steelhead is shown in Table 10 for hatchery production at both DCFH and CVFF.

The Index of Ecological Risk values for DCFH range from 3.5% to 5.5.%. For CVFF, the values range from 6.9% to 14.7%. The index values are higher for CVFF as more hatchery fish are released under this alternative at this facility. The index values are higher for juveniles than smolts as they are smaller in size and more susceptible to predation by the larger hatchery steelhead.

Based on the index values, Alternative 2 (No Action – Status Quo Production) poses low adverse ecological effects to Russian River steelhead.

Table 10. Index of Ecological Risk hatchery steelhead released from DCFH and CVFF pose to NOR steelhead smolts and juveniles under Alternative 2 (No Action -Status Quo Production)*

Species	Life Stage	DCFH	CVFF
Steelhead	Smolts	5.5%	6.9%
	Juveniles	3.5%	14.7%

*Maximum index value possible is 100%

4.3.2.2 Central California Coast (CCC) Coho Salmon

The Index of Ecological Risk associated with Alternative 2 (No Action – Status Quo Production) ranges from 4.2% to 99.0% for Coho Salmon (Table 11). Again, the index values were developed based on PCDRISK modeling (USACE and CDFW 2021).[11]

Based on the index values shown in Table 11, Alternative 2 (No Action – Status Quo Production) would result in continued high adverse effects to Coho Salmon juveniles and low adverse effects to smolts. Index values are higher for juvenile Coho Salmon as they are smaller than smolts and are therefore more susceptible to predation by the larger hatchery steelhead.

The 300,000 HOR steelhead from DCFH released to Dry Creek is of especial concern as this population produces relatively large numbers of endangered Coho Salmon and is one of the subbasins stocked with hatchery Coho Salmon from the Russian River Coho Salmon Captive Broodstock Program (CDFW and USACE 2017). The degree of effect of steelhead predation on juvenile Coho Salmon is considered high adverse. Because predation also reduces the number of NOR Coho Salmon juveniles, population effects are also rated as high adverse.

Table 11. Index of Ecological Risk for hatchery steelhead releases from DCFH and CVFF to CCC Coho Salmon for Alternative 2 (No Action – Status Quo Production).

Species	Life Stage	DCFH	CVFF
Coho	Smolts	4.2%	9.7%
	Juveniles	96.8%	99.0%

4.3.2.3 California Coastal (CC Chinook)

Under Alternative 2 (No Action – Status Quo Production) the ecological effects to CC Chinook of the Russian River will be negligible adverse which means population effects are also negligible adverse.

The Index of Ecological Risk from PCD Risk modeling ranged from 2.4% (CVFF) to 6.2% (DCFH) (USACE and CDFW 2021). The index was higher for DCFH steelhead releases (300,000) to Dry Creek as these fish may prey on the relatively large number of Chinook juveniles inhabiting this small (14 mile) stream (USACE and CDFW 2021). In contrast, fish from CVFF are released higher in the watershed into the East Fork Russian River, where they then migrate through the much larger Russian River to the ocean, resulting in lower steelhead to Chinook juvenile density ratios and thus decreased predation.

[11] Status Quo production is the same as described for Current conditions in the HGMP.

4.3.3 Other Fish Species

Under Alternative 2 (No Action – Status Quo Production), those species identified in Table 5 as a "predator of salmon eggs, fry, or juveniles" and/or those identified as benefiting from "carcasses of hatchery-origin fish" are reasonably expected to be beneficially affected (negligible beneficial) under Alternative 2 (No Action – Status Quo Production). Hatchery fish spawning naturally will produce eggs and offspring that may be consumed by these other species. However, because of the size of the steelhead released only the largest species (smallmouth bass, striped bass etc.) will be able to consume hatchery juvenile steelhead.

Additionally, the fish identified in Table 5 as "competing with salmon for food and space" may experience low adverse effects due to decreased availability of resources (i.e., food and habitat) from competition with HOR juvenile steelhead.

4.3.4 Wildlife

Under Alternative 2 (No Action – Status Quo Production), wildlife found in the action area (Table 6) that are predators of salmon adults, fry, and juvenile fish will experience some beneficial effects from the continued production of steelhead at the two facilities, but the benefit will be negligible (i.e., negligible beneficial).

4.3.5 Cultural Resources

Effects to cultural resources typically occur when an action disrupts or destroys cultural artifacts, disrupts cultural use of natural resources, or would disrupt cultural practices. Under Alternative 2 (No Action – Status Quo), although a permit would not be issued, it would still result in the continued utilization of existing facilities for rearing, breeding, and transportation and release of hatchery fish. Because existing facilities and roadways would be utilized for associated Program operations that avoid culturally important artifacts, there will be no significant effects to these cultural resources under Alternative 2 (No Action – Status Quo Production).

Under Alternative 2 (No Action – Status Quo) hatchery production and its negative effects to NOR fish will be ongoing. This may result in continued decrease in NOR population abundance and productivity with increased extirpation risk. However, the Tribes would still have access to HOR fish regardless of NOR abundance to meet cultural needs such as harvest. Because few fish are harvested by the Tribes the degree of effect of this alternative to cultural resource is considered negligible beneficial.

In contrast, the degree of effect of Alternative 1 (No Action – No Production) to cultural resources was rated at moderate adverse because both NOR and HOR populations could be eliminated.

4.3.6 Harvest

Under Alternative 2 (No Action – Status Quo Production), the degree of effect to sport harvest in the Russian River will be high beneficial. The average number of HOR steelhead harvested from 2006-2015 annually was 648 adults (Table 4). According to Steelhead Report Card data provided by CDFW, a similar number (551) are caught but then released. Because under this alternative

hatchery production would be maintained at levels like those that existed from 2006 to 2015, this level of harvest is expected to continue.

4.4 Alternative 3 (Proposed Action)

Under Alternative 3 (Proposed Action), NMFS would determine that the submitted permit application sufficiently meets the criteria necessary to issue an ESA section 10(a)(1)(A) enhancement permit and would ultimately issue the section 10(a)(1)(A) enhancement permit to USACE for a period of ten years. Permit issuance would grant then permission for the take of the ESA-listed species associated with the proposed Program in the HGMP. This would include implementation of risk aversion measures to minimize the likelihood for adverse genetic and ecological effects related to listed species, wildlife, and water resources.

Hatchery steelhead production under Alternative 3 (Proposed Action) would initially be set at 400,000 yearling steelhead, with equal numbers released at DCFH and CVFF. The DCFH steelhead would not be released in Dry Creek but instead transported and released to the Russian River near Healdsburg, California. Hatchery steelhead production could be increased to 500,000 if identified management performance metrics for PNI, pHOS etc. were achieved, but this outcome is not expected within the term of the permit.

In this section, Alternative 3 (Proposed Action) effects to resource is compared to each No Action alternative. This is required because it is uncertain as to which No Action alternative the USACE would implement if NMFS does not issue an ESA section 10(a)(1)(A) permit.

4.4.1 Water Resources

The effects Alternative 3 (Proposed Action) has on Russian River water resources is presented below. A summary of the effects for each alternative has on this resource is provided in Table 12.

4.4.1.1 Water Quantity

The effects to water quantity from Alternative 3 (Proposed Action) would be negligible adverse. This occurs because the water used to rear Program fish is non-consumptive and released back to the streams to provide minimum flows. Any water loss is due to evaporation and water leakage during hatchery operations which is minimal.

Because hatchery operations would be eliminated in Alternative 1 (No Action – No Production) the minor loss in water from hatchery operations would not occur and therefore result in a negligible benefit to water quantity in Dry Creek and East Fork Russian River.

It is assumed that under both Alternative 3 (Proposed Action) and Alternative 2 (No Action – Status Quo Production) the USACE will use its full water right to rear fish. Therefore, water losses due to evaporation and leakage for both alternatives would be similar (i.e., negligible adverse).

4.4.1.2 Water Quality

The degree of effect to water quality from the issuance of a permit for Alternative 3 (Proposed Action) is expected to be negligible adverse. Under both this alternative and Alternative 2 (No Action – Status quo Production) hatchery facilities would continue to operate consistent with their NPDES permit. Compliance with permit conditions is monitored through effluent sampling two times a month and the following parameters are measured: total suspended and settleable solids, pH, salinity, temperature, turbidity, and dissolved oxygen. Daily maximums for these parameters were set based on beneficial uses for Dry Creek and East Fork Russian River. If NPDES standards are violated hatchery staff will implement corrective actions.

In contrast, the elimination of the Program under Alternative 1 (No Action – No Production) is expected to have negligible beneficial effects to water quality as any adverse effects to water quality are eliminated.

Table 12. Summary of effects to water quantity and quality for each analysis alternative.

Alternative	Water Quantity	Water Quality
Alternative 1 (No Action - No Production	Negligible Beneficial	Negligible Beneficial
Alternative 2 (No Action - Status Quo Production	Negligible Adverse	Negligible Adverse
Alternative 3 (Proposed Action)	Negligible Adverse	Negligible Adverse

4.4.2 Salmon and Steelhead

The beneficial and adverse effects Alternative 3 (Proposed Action) has on salmon and steelhead populations in the Russian River are presented below.

Since the publication of the draft EA, there has been the detection of New Zealand Mud Snails (NZMS) at the DCFH and at the outlet of CVFF in 2023. The detection of NZMS has prompted CDFW's steelhead program to redouble its efforts to avoid the spread of this aquatic invasive species. NZMS can affect the growth rates of all juvenile salmonids and other wildlife that consume prey that the NZMS outcompete for habitat space. To ensure NZMS are not spread to other watersheds, steelhead outplantings continue to be limited to areas that are NZMS positive. Such actions are supported by NZMS presence confirmation surveys in advance of releases. CDFW will continue to operate consistent with all federal and state policies, including conforming to the National Pollution Discharge Elimination and Aquatic Invasive Species testing and reporting requirements. In addition, CDFW will explore eradication procedures to eliminate NZMS from all facilities as well as the waters and equipment used for transport, to broaden the list of waters eligible to receive steelhead in the future. Due to the measures taken by CDFW the effect is Negligible Adverse. The mitigation measures would occur under Alternative 2 (No Action – Status Quo Production and Alternative 3 (Proposed Action).

4.4.2.1 Central California Coast (CCC) Steelhead DPS

Population Effects

Alternative 3 (Proposed Action) is expected to provide moderate beneficial effects to Dry Creek and Upper Russian River steelhead population abundance (Table 13 and Table 14). The release of hatchery juveniles at DCFH and CVFF produce an average of 177 and 284 returning HOR adults that spawn naturally in both Dry Creek and the Upper Russian River, respectively. The offspring of these hatchery adults contribute to natural production in both streams. Additionally,

some of the hatchery adults spawn in other tributaries which may also result in an increase in natural steelhead production (Table 8).

Natural steelhead production in both Dry Creek and the Upper Russian River population is expected to be the greatest for Alternative 1 (No Action – No Production). However, as discussed in section 4.2.2.1 of this EA, the elimination of hatchery fish spawning naturally could result in a severe decline in natural adult steelhead production over both the short – and long term due to decreased population genetic fitness (i.e., productivity) from past hatchery operations. This decrease in abundance and productivity increases the risk that steelhead may become extirpated from the Russian River.

Table 13. Comparison of key Dry Creek steelhead population parameters for Alternative 1 (No Action – No Production), Alternative 2 (No Action – Status Quo Production) and Alternative 3 (Proposed Action). Analysis was conducted using the All-H model (USACE and CDFW 2021) (Appendix A).

Parameter	Alternative 1 (No Action - No Production)	Alternative 2 (No Action - Status Quo Production)	Alternative 3 (Proposed Action)
NOR Escapement (adults)	571	452	431
HOR Natural Escapement (Adults)	0	975	177
Total Adult Run-size (HOR + NOR)	571	5,872	4,068
NOR Broodstock (Adults)	0	<5	90
NOR Broodstock (Juveniles)	0	0	6,000
PNI	1.0	0.1	0.67
pHOS	0	0.63	0.25
Population Fitness (range 0.5 to 1.0)	1.0	0.5	0.83

Table 14. Comparison of key Upper Russian River steelhead population parameters for Alternative 1 (No Action – No Production), Alternative 2 (No Action – Status Quo Production) and Alternative 3 (Proposed Action). Analysis was conducted using the All-H model (USACE and CDFW 2021).

Parameter	Alternative 1 (No Action - No Production)	Alternative 2 (No Action - Status Quo Production)	Alternative 3 (Proposed Action)
NOR Escapement (adults)	1,617	1,159	1,364
HOR Natural Escapement (Adults)	0	1,317	284
Total Adult Run-size (HOR + NOR)	1,617	4,796	5,028
NOR Broodstock (Adults)	0	<5	54
NOR Broodstock (Juveniles)	0	0	6,000
PNI	1.0	0.03	0.67
pHOS	0	0.48	0.15
Population Fitness (range 0.5 to 1.0)	1.0	0.5	0.85

Under Alternative 3 (Proposed Action), 144 NOR adults will be collected and used as broodstock. These NOR fish may be collected at traps or by sport fishers trained to catch, handle and transport NOR steelhead. In contrast, fewer than 10 and zero NOR adults would be used as broodstock for Alternative 2 (No Action – Status Quo Production) and Alternative 1 (No Action – No Production), respectively. The removal of NOR adults for broodstock in Alternative 3 (Proposed Action) is expected to be low adverse. The HGMP also assumes that NOR adults

collected for broodstock will experience some minor mortality both during collection and then transport to DCFH. The level of effect of collection on the NOR population is expected to be negligible adverse.

Because it may be difficult to collect the 144 NOR adult steelhead needed to integrate the broodstock in Alternative 3 (Proposed Action), the Program may collect up to 12,000 NOR fry from any Russian River steelhead population or stream and transfer them to the hatchery to produce additional NOR adults. However, fry from Dry Creek and streams from the Upper Russian River populations would be preferred as they are used for Program integration. Therefore, impacts of fry collection will be higher for these populations than others.

The collected fry would be reared for one year and released as smolts directly from each hatchery. These fish are expected to return as adults to the facility where they were released, thus reducing the need to actively trap or use sport fishers to collect returning adults.[12] This action is expected to produce an average of 130 NOR adults per year (low beneficial effect) (USACE and CDFW 2021). Fry collection for broodstock does not occur in Alternative 2 (No Action - Status Quo Production) and Alternative 1 (No Action – No Production) so there is no effect on NOR fry.

According to the analysis presented in the HGMP, the removal of 12,000 NOR fry is theorized to reduce NOR adult production by 6 fish, i.e., a negligible adverse effect on the natural population of steelhead (USACE and CDFW 2021). The hatchery rearing of NOR fry may result in some domestication effects, but if survival rates during the rearing phase is high, these effects are expected to be minor.[13]

Although hatchery fish spawning naturally may increase natural steelhead production, they also reduce the genetic population fitness of the natural population by interbreeding. The PNI for Alternative 3 (Proposed Action) is to be 0.67 for both Dry Creek and Upper Russian River steelhead populations. This is a significant increase in PNI compared to Alternative 2 (No Action – Status Quo Production) that ranges from 0.03 to 0.1, but less than the 1.0 PNI value for Alternative 1 (No Action – No Production).

PNI values below 0.5 indicate that the hatchery environment, rather than the natural environment, is driving local adaptation of the population. Higher PNI values result in higher population fitness values which should result in greater population productivity and abundance (Figure 10). Eliminating hatchery production (Alternative 1 (No Action – No Production)) has the largest effect (high beneficial) on population fitness as hatchery fish no longer spawn naturally and breed with naturally produced fish. The population fitness values for Alternative 3 (Proposed Action) are higher than Alternative 2 (No Action – Status Quo Production) because fewer hatchery fish spawn naturally (pHOS) in this alternative.

[12] A NOR adult is defined as the offspring of any adult (HOR or NOR) that spawned naturally. Thus, any fry or juveniles collected from a stream are an NOR (i.e., naturally produced).

[13] A high survival rate ensures that rearing practices are not selecting for traits that thrive in an artificial environment but may be poorly adapted for survival in the natural environment.

Under Alternative 3 (Proposed Action) the Program goal is to maintain pHOS below 0.30 in Dry Creek and the Upper Russian River populations and less than 5% in populations not integrated with the Program (HSRG 2014). The less than 5% pHOS value will apply to the following CCC steelhead populations:

- Austin Creek (Potentially Independent, North Coastal Diversity Stratum)
- Green Valley Creek (Potentially Independent, North Coastal Diversity Stratum)
- Mark West Creek (Potentially Independent, North Coastal Diversity Stratum)
- Maacama Creek (Potentially Independent, Interior Diversity Stratum)

Currently, where data is available, average pHOS in these populations ranges from 17% to 67% (Table 8). The pHOS values expected in Alternative 3 (Proposed Action should result in improved steelhead population fitness, abundance, and productivity (i.e., moderate beneficial) effect) compared to Alternative 2 (No Action – Status Quo Production) which is considered to have a high adverse effect to Russian River steelhead. Because hatchery steelhead production is terminated in Alternative 1 (No Action – No Production) pHOS will decrease to zero, a high beneficial effect to NOR steelhead in the basin.

Under Alternative 3 (Proposed Action) the Program will implement monitoring to document that performance metrics such as pHOS and PNI are being achieved. This monitoring does not occur in the other two alternatives.

Ecological Effects

The ecological risk (predation and competition)[14] each of the three analysis alternatives may have on steelhead is shown in Table 15 for hatchery production at both DCFH and CVFF.

DCFH

The Index of Ecological Risk hatchery releases from DCFH pose to naturally produced steelhead smolts and juveniles in the Dry Creek population ranged from 0% (Alternative 1 (No Action – No Production)) (no effect) to 5.5% for Alternative 2 (No Action – Status Quo Production) (negligible adverse). The Index of Ecological Risk for Alternative 3 (Proposed Action) was less than 1% (Figure 11) (negligible adverse).

[14] Disease effects are not included in the PCD Risk Model. Disease risk is eliminated in Alternative 1 (No Action – No Production) and is considered negligible adverse in the other two alternatives.

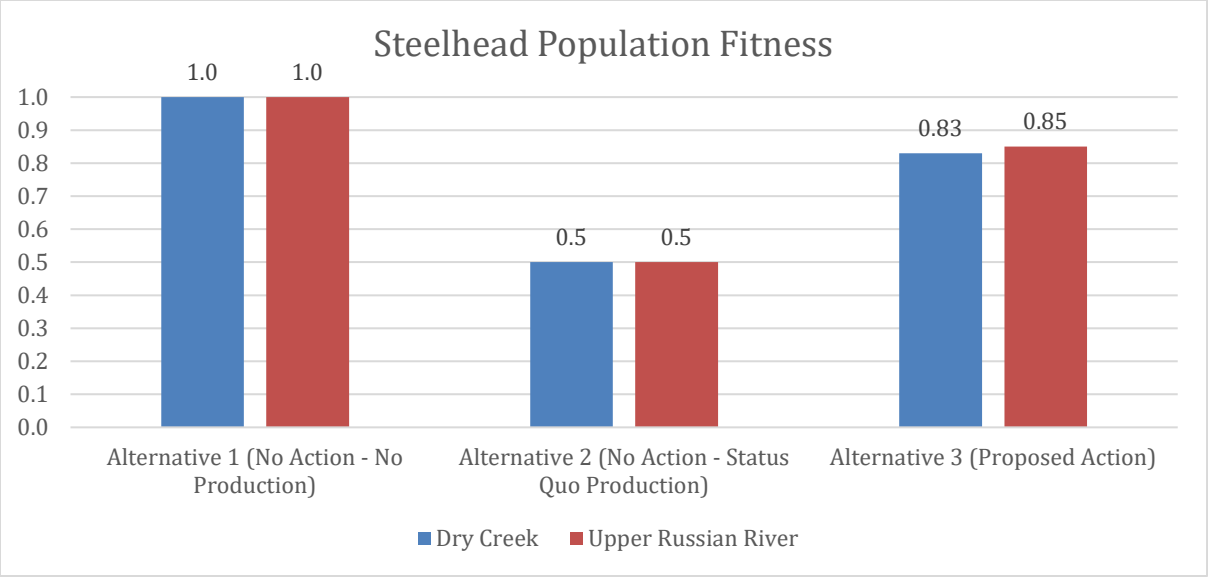


Figure 10. Population fitness values for Dry Creek and Upper Russian River steelhead populations for Alternative 1 (No Action – No Production), Alternative 2 (No Action – Status Quo Production) and Alternative 3 (Proposed Action). Analysis was conducted using the All-H model (USACE and CDFW 2021) (Appendix A).

Table 15. Index of Ecological Risk hatchery steelhead released from DCFH (Dry Creek) and CVFF (East Fork Russian River pose to NOR steelhead smolts and juveniles under Alternative 1 (No Action – No Production), Alternative 2 (No Action – Status Quo Production) and Alternative 3 (Proposed Action).

Species	Life Stage	DCFH (Dry Creek)			CVFF (East Fork Russian River)		
		Alternative 1 (No Action - No Production	Alternative 2 (No Action - Status Quo Production)	Alternative 3 (Proposed Action) *	Alternative 1 (No Action - No Production	Alternative 2 (No Action - Status Quo Production)	Alternative 3 (Proposed Action)
Steelhead	Smolts	0%	5.5%	1.0%	0.0%	6.9%	6.9%
	Juveniles	0%	3.5%	1.0%	0.0%	21.6%	14.7%
Coho Salmon	Smolts	0%	4.2%	1.0%	0.0%	9.7%	9.7%
	Juveniles	0%	97.0%	1.0%	0.0%	99.0%	99.0%
Chinook	Juveniles	0%	6.2%	1.0%	0.0%	2.4%	2.4%

*Index values were less than 1%

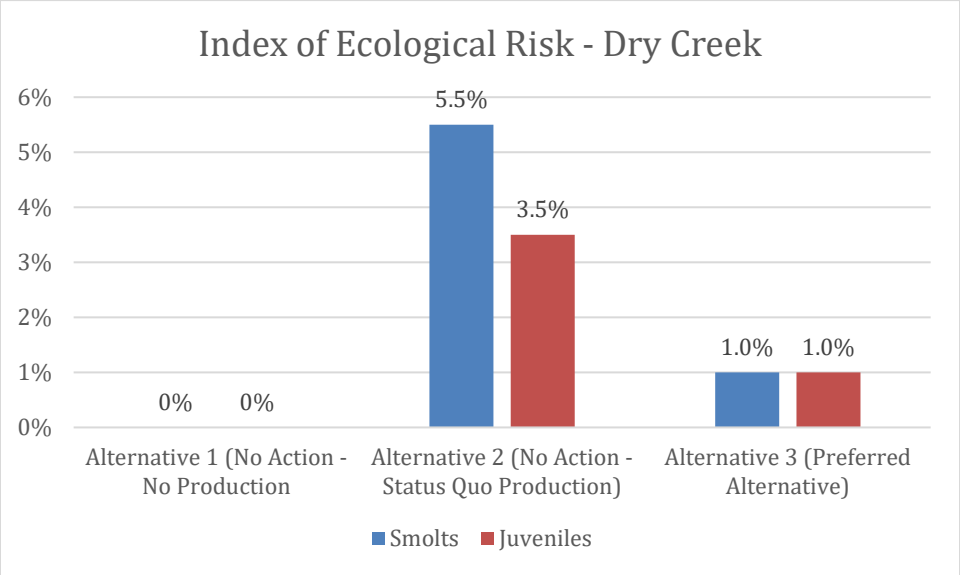


Figure 11. The Index of Ecological Risk to the Dry Creek steelhead population from the implementation of each of the three analysis alternatives. Index values are based on steelhead released from DCFH.

The index values for Alternative 3 (Proposed Action) are lower than Alternative 2 (No Action – Status Quo Production) because of the following actions proposed in the HGMP:

1. Altering the fish release location from the DCFH to the mouth of Dry Creek or mainstem Russian River at Healdsburg, California. This action substantially reduces interactions (competition) between hatchery fish and naturally produced steelhead in Dry Creek.
2. Reducing the number of hatchery fish released from 300,000 to 200,000 at DCFH. A decrease in fish production results in a decrease in competition.[15]
3. Reducing average hatchery fish release size from 230mm to a range extending from 170mm - 200mm. Releasing fish at a size range that mimics NOR steelhead smolts is expected to reduce competition effects to NOR steelhead as it is assumed that a larger fish dominates a smaller fish when competing for food and space.

A reduction in fish release number and size under Alternative 3 (Proposed Action), compared to Alternative 2 (No Action – Status Quo Production) will also reduce ecological risk to the CCC

[15] Under Alternative 3 (Proposed Action) the hatchery could increase steelhead production to 300,000 if identified performance metrics were achieved. For this analysis it is assumed that this will not occur during the term of the permit.

steelhead populations located downstream of Dry Creek (Austin Creek, Green Valley Creek and Mark West Creek)[16] for the same reasons as presented above for Dry Creek. The data collected by Sonoma Water indicate that HOR steelhead smolts captured in streams where traps are operated make up a relatively small portion of the total steelhead captured (Figure 13). A reduction in HOR steelhead smolt production under Alternative 3 (Proposed Action) should reduce the number of HOR steelhead found in these streams.

Because steelhead smolts released from DCFH under Alternative 2 (No Action – Status Quo Production) and Alternative 3 (Proposed Action) are not expected to migrate in large numbers upstream of Dry Creek after entering the Russian River, ecological risk to Maacama Creek and the Upper Russian River populations are expected to be similar (negligible adverse).

Alternative 1 (No Action – No Production) has no ecological effects to Russian River steelhead as hatchery production does not occur under this alternative.

CVFF

The Index of Ecological Risk hatchery releases from CVFF pose to naturally produced steelhead smolts and juveniles of the Upper Russian River population ranges from 0% (Alternative 1 (No Action – No Production)) (no effect) to 21.6% for Alternative 2 (No Action – Status Quo Production) (low adverse). The Index of Ecological Risk for Alternative 3 (Proposed Action) was less than 15% (Figure 12) (low adverse).

The difference in the index scores for Alternative 2 (No Action – Status Quo Production) and Alternative 3 (Proposed Action) results from the smaller number of hatchery fish released at CVFF under Alternative 3 (Proposed Action). This in turn results in fewer hatchery steelhead residualizing thereby reducing competition and predation effects to NOR steelhead.

The release of hatchery fish from CVFF under both Alternative 2 (No Action – Status quo Production) and Alternative 3 (Proposed Action) will have the largest effect on the Upper Russian River steelhead population as this facility is located high in the basin in the East Fork Russian River (Figure 1). The released fish have the potential to negatively affect the portion of the Upper Russian River steelhead population using the mainstem Russian River. These two alternatives ecological effects to potentially independent populations (Maacama Creek, Mark West Creek, Dry Creek, Green Valley Creek and Austin Creek) will be lower as released fish will have experienced some level of migration mortality prior to arriving in the lower Russian River. Additionally, the effects to these steelhead populations will generally be limited to

[16] The Index of Ecological Risk for steelhead residing in the mainstem Russian River below Dry Creek would be similar (negligible adverse) for Alternatives 2 and 3, because all released fish must migrate through this reach to reach the ocean.

interactions occurring in the mainstem Russian River as HOR steelhead from CVFF are not expected to enter the tributaries in significant numbers (Figure 13).[17]

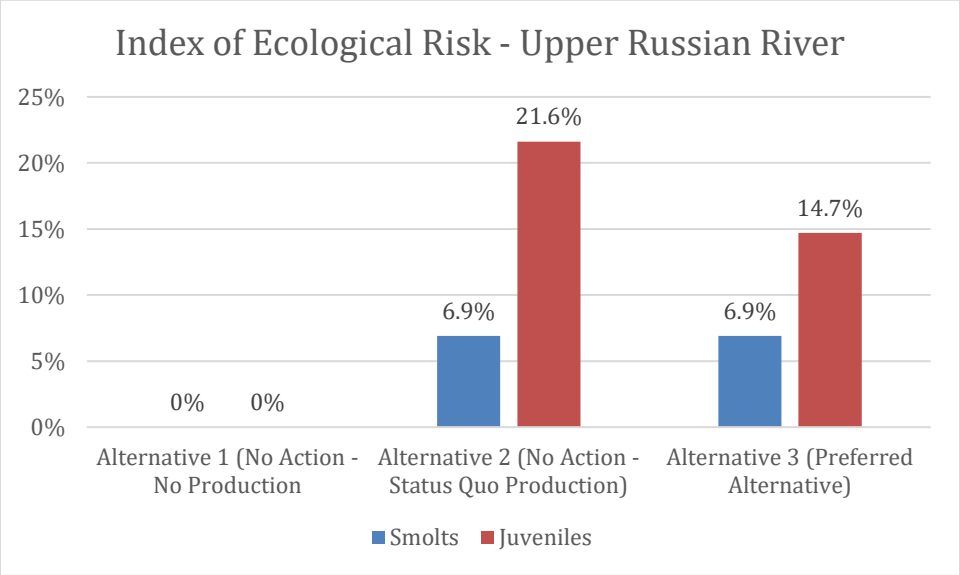


Figure 12. The Index of Ecological Risk to the Upper Russian River steelhead population from the implementation of each of the three analysis alternatives. Index values are based on steelhead released from CVFF.

For Alternative 3 (Proposed Action), the Program will conduct predation studies to quantify ecological effects to CCC steelhead. The results will be used to adjust Program operations to reduce effects to this species. Additionally, the Program under this alternative has identified risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed steelhead from any studies, monitoring or evaluation activities. These risk aversion measures are not included in the other alternatives.

[17] Note that HOR steelhead are not marked in a manner that allows distinction between fish released from CVFF and DCFH. Thus, the origin of the HOR steelhead found in tributaries is unknown.

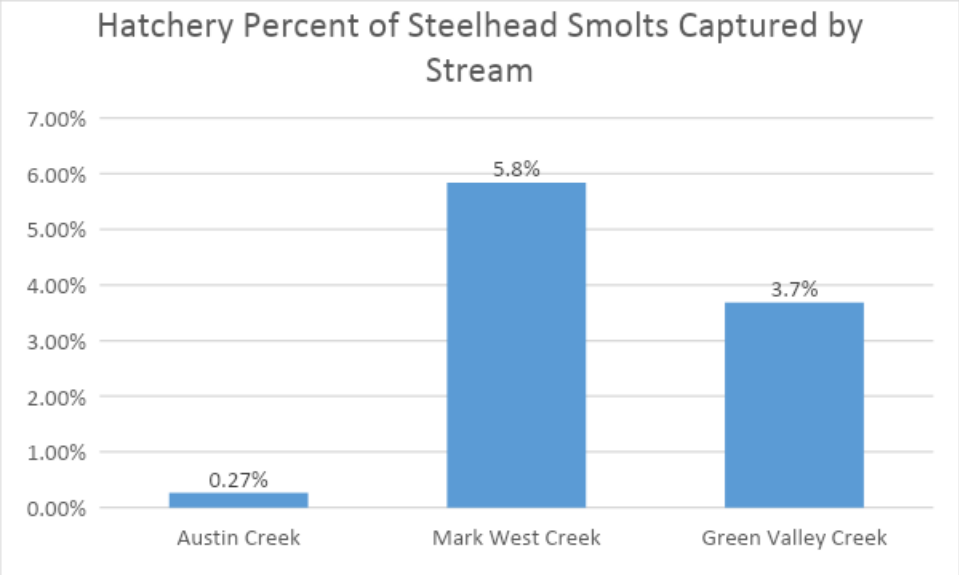


Figure 13. Hatchery percent of steelhead smolts captured in Austin Creek (2010-2021), Mark West Creek (2012 – 2021) and Green Valley Creek (2005 – 2009). Data provided by Greg Horton, Sonoma Water (2021).

4.4.2.2 Central California Coast (CCC) Coho Salmon

The Index of ecological risk values for each of the three analysis alternatives on CCC Coho Salmon are shown in Figure 14 for DCFH steelhead released to Dry Creek and Figure 15 for CVFF releases to the Upper Russian River. There would be no ecological effects to Coho Salmon from Alternative 1 (No Action – No Production) because hatchery steelhead production does not occur in this alternative.

DCFH

The Index of Ecological Risk values for Alternative 3 (Proposed Action) is approximately 1% (negligible adverse) for the Dry Creek Coho Salmon population (Figure 14). These values are like Alternative 1 (No Action – No Production) and substantially less than those for Alternative 2 (No Action – Status Quo Production); the ecological effects to Dry Creek Coho Salmon for these two alternatives were classified as no effect and high adverse effect, respectively.

The Index of Ecological Risk values for Alternative 3 (Proposed Action) were significantly lower than Alternative 2 (No Action – Status Quo Production) because hatchery Coho Salmon are not released directly to Dry Creek, but instead are released to the mainstem Russian River. This action is theorized to substantially reduce predation rates on juvenile Coho Salmon rearing in Dry Creek and result in an increase in Coho Salmon production for this population only (high beneficial).

Both Alternative 2 (No Action – Status Quo Production) and Alternative 3 (Proposed Action) are expected to have somewhat similar ecological effects (predation) to any juvenile Coho Salmon rearing in the mainstem Russian River below the confluence of Dry Creek and the Russian River. The ecological effect of hatchery production on these mainstem rearing juvenile fish would likely be substantial for both alternatives. However, because few juvenile Coho Salmon are likely rearing in the mainstem Russian River overall effect to the total Russian River Coho Salmon population is assumed to be negligible adverse for both alternatives.

Under Alternative 3 (Proposed Action), CDFW proposes to conduct predation studies to quantify ecological effects (predation) to CCC Coho Salmon. The results will be used to adjust Program operations to reduce effects to this species. Additionally, the Program has identified risk aversion measures that will be applied to minimize the likelihood for adverse effects to listed Coho Salmon from any studies, monitoring, or evaluation activities. These risk aversion measures are not included in the other alternatives.

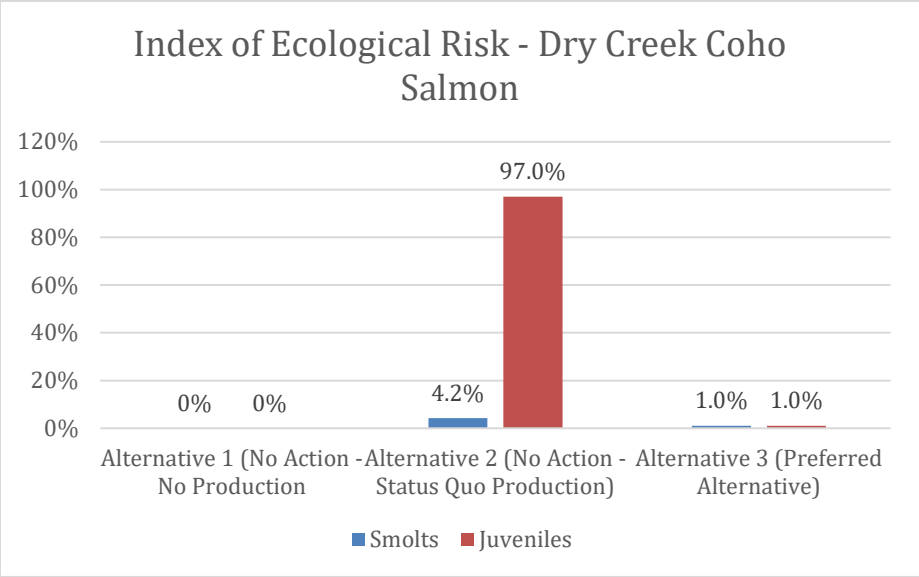


Figure 14. Index of Ecological Risk to Dry Creek Coho Salmon for each of three analysis alternatives.

CVFF

Hatchery fish from CVFF are released into the East Fork Russian River, which is a tributary located within the Upper Russian River steelhead population. Coho Salmon have not historically and do not currently inhabit this stream nor are they likely found in large numbers in the mainstem Russian River (or associated tributaries), upstream of Maacama Creek, a known producer of Coho Salmon (Figure 1).

Both Alternative 2 (No Action – Status Quo Production) and Alternative 3 (Proposed Action) are expected to have somewhat similar ecological effects (predation) to any juvenile Coho Salmon rearing in the mainstem Russian River upstream of Maacama Creek. The ecological effect of hatchery production on these mainstem rearing fish would be substantial for both alternatives (Figure 15).[18] However, because few juvenile Coho Salmon are likely rearing in the mainstem Russian River, the overall effect to the total Russian River Coho Salmon population is assumed to be negligible adverse for both alternatives.

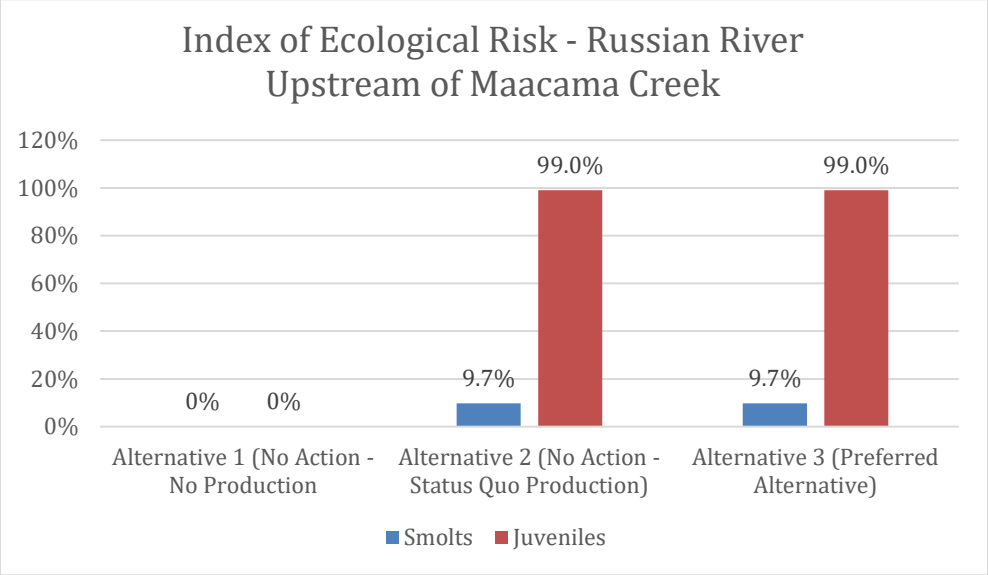


Figure 15. Index of Ecological Risk for Coho Salmon rearing in the Russian River upstream of Maacama Creek for each of three analysis alternatives.

4.4.2.3 California Coastal (CC) Chinook

If NMFS issues an ESA section 10(a)(1)(A) permit for the Program as submitted under Alternative 3 (Proposed Action), the effects to Chinook salmon will be negligible adverse based on the results of PCD Risk modeling that ranged from 1% to 2.4% (Figure 16). The index values are similar to those for Alternative 1 (No Action – No Production) and Alternative 2 (No Action – Status Quo Production). The ecological effects for Alternative 1 (No Action – No Production) and Alternative 2 (No Action – Status Quo Production) were rated as no effect and negligible adverse effect, respectively. Because the ecological risk (primarily predation) is negligible adverse, the degree of effect to the Russian River Chinook population is also negligible adverse.

The low index values for alternatives 2 and 3 result primarily from the low ratio of steelhead released to juvenile Chinook abundance (CDFW and USACE 2021). The index value for DCFH

[18] The PCD Risk model uses the ratio of hatchery steelhead released to total juvenile Coho Salmon abundance as one input to determine ecological effects. The higher the ratio, the larger the effect on Coho Salmon.

for Alternative 3 (Proposed Action) is lower than Alternative 2 (No Action – Status Quo Production) because hatchery steelhead are not released directly to Dry Creek.

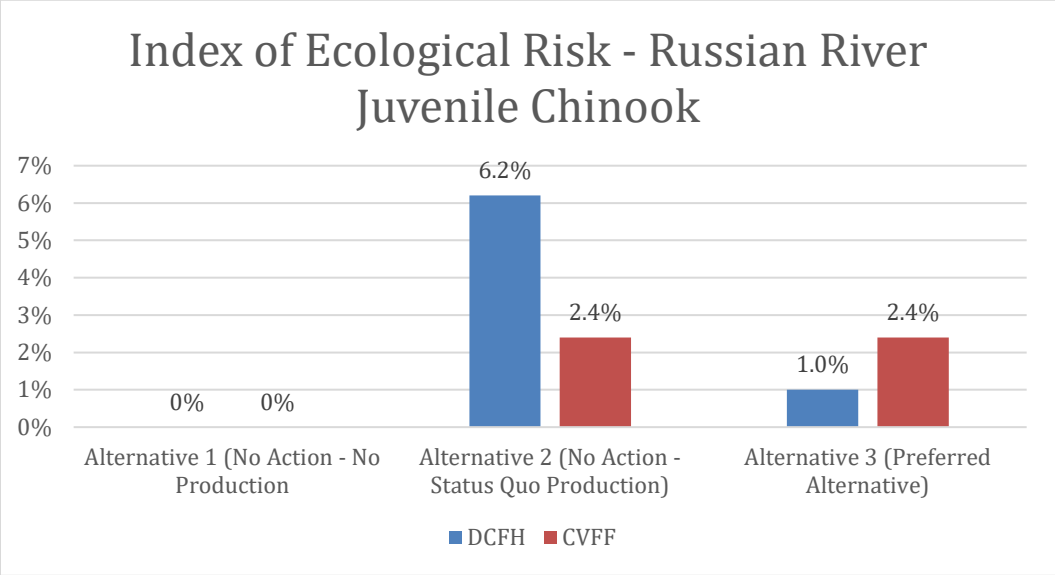


Figure 16. Index of Ecological Risk for Chinook from steelhead released at DCFH and CVFF for each of three analysis alternatives.

4.4.3 Other Fish Species

Under Alternative 3 (Proposed Action), those species identified in Table 5 as a "predator of salmon eggs, fry, or juveniles" and/or those identified as benefiting from "carcasses of hatchery-origin fish" are reasonably expected to benefit these species, but the degree of effect will be negligible beneficial.

Hatchery fish spawning naturally will produce eggs and offspring that may be consumed by these other species. However, because of the size of the steelhead released only the largest species (smallmouth bass, striped bass etc.), or members of each species will be able to consume hatchery juvenile steelhead.

The reduction in the number of surplus adults released to the Action Area under Alternative 3 (Proposed Action) will reduce marine derived nutrients returned to the system that could in-turn decrease food availability and productivity of the ecosystem. However, given the size of the Russian River Basin and the number of fish released, any effects to other fish species from a decrease in steelhead carcasses will be undetectable.

Under Alternative 3 (Proposed Action) it is also possible that fish identified in Table 5 as "competing with salmon for food and space" may experience continued negligible adverse

effects due to decreased availability of resources (i.e., food and habitat) from competition with HOR juvenile steelhead.

No longer releasing HOR steelhead to Dry Creek in Alternative 3 (Proposed Action) will substantially reduce any competition and predation effects hatchery fish have on other fish species inhabiting the stream, compared to Alternative 2 (No Action – Status Quo Production). This decrease could result in an increase in abundance for some of these species, but the ability to observe such a change is likely undetectable.

There are no competition and predation effects to other fish species associated with Alternative 1 (No Action – No Production) as hatchery production of steelhead would not occur.

4.4.4 Wildlife

Like the description above concerning effects to "other fish species", wildlife found in the action area (Table 6) that are predators of salmon adults, fry, and juvenile will experience negligible beneficial effects from Program operations under Alternative 3 (Proposed Action).

The number of steelhead released in this alternative decrease from 500,000 to 400,000 fish short-term, compared to Alternative 2 (No Action – Status Quo Production), but may increase back to 500,000 upon the achievement of performance metrics (e.g., PNI, pHOS etc.). The smaller number of surplus adults released to the Action Area for this alternative will reduce food availability to wildlife compared to Alternative 2 (No Action – Status Quo Production) but increase it in contrast to Alternative 1 (No Action – No Production).

4.4.5 Cultural Resources

As described previously, effects to cultural resources typically occur when an action disrupts or destroys cultural artifacts, disrupts cultural use of natural resources, or would disrupt cultural practices. Under Alternative 3 (Proposed Action), a permit for the SCSCBP would be issued, resulting in utilization of existing facilities for rearing and breeding, and increased transportation of fish to and from action area streams. Because existing facilities and roadways would be utilized for associated Program operations, which already avoid culturally important artifacts, there will be no significant effects to these cultural resources under Alternative 3 (Proposed Action) and for the other alternatives as well.

During the term of the permit (10-years), it is expected that total adult steelhead in the Action Area will be lower than Alternative 2 (No Action – Status Quo Production), but higher than Alternative 1 (No Action – No Production). The reduction and/or elimination of adult steelhead production results in fewer fish being available for tribal harvest. Because the tribes catch few, if any, steelhead in the Action Area the decrease in hatchery production is expected to have negligible adverse effects to this cultural resource.

4.4.6 Harvest

According to the data in Table 4, the average number of HOR steelhead harvested from 2006-2015 annually was 648 adults. According to Steelhead Report Card data provided by CDFW, a similar number (551) are caught but then released. It is assumed that a 20% decrease in hatchery steelhead production in Alternative 3 (Proposed Action), compared to Alternative 2 (No Action – Status Quo Production) could decrease the number of adults caught by 20% resulting in a moderate adverse effect on sport fish catch; however, this value is speculative at this time. The program will implement a creel survey to document any change in the number of steelhead caught each year in Alternative 3 (Proposed Action), but not in the other analysis alternatives.

Additionally, in Alternative 3 (Proposed Action) CDFW may release HOR adult's surplus to broodstock needs to non-anadromous waters to provide additional sport harvest opportunity in the basin. There will be no effects of this action on any ESA listed anadromous species.

As described above, it is assumed that a 20% reduction in hatchery production would result in a 20% reduction in fishing effort and a similar reduction in the number of NOR caught (463) and resulting mortality (46). Thus, the implementation of Alternative 3 (Proposed Action) would have low beneficial effects (fewer NORs caught and killed) to NOR steelhead adults compared to Alternative 2 (No Action – Status Quo Production).

Because hatchery production is eliminated in Alternative 1 (No Action – No Production) it is assumed that the sport fishery targeting hatchery steelhead would also be terminated by CDFW to protect naturally produced steelhead. This would result in a high adverse effect to sport harvest.

5 Short- and Long-term Effects

5.1 Introduction

Section 3, Affected Environment, describes the existing conditions for each resource and reflects the effects of past actions and present conditions. Section 4, Environmental Consequences, evaluates the effects of the alternative for each resource's existing conditions. This section (5) considers the short- and long-term effects of reasonably foreseeable future actions and conditions in the action area.

5.2 Effects on Climate Change from Alternatives

None of the alternatives are expected to result in significant short-term effects to climate change. No activities would occur under the three alternatives that would result in significant changes to greenhouse gas emissions or other pollutants that are likely to contribute to environmental conditions associated with climate change.

Under Alternative 1 (No Action – No Production), the amount of carbon emitted due to steelhead hatchery production would be reduced to zero. Under Alternative 3 (Proposed Action), carbon emissions would likely decrease slightly, compared to Alternative 2 (No Action – Status Quo Production). because fewer truck trips may be required to transport fish between hatchery

facilities and for release to the river. Carbon emissions may be decreased further if the USACE purchases new higher mileage transport trucks during the short-term of the permit.

5.3 Reasonably Foreseeable Future Actions

These actions have occurred in the past, are currently occurring, and are expected to continue into the foreseeable future throughout the ten-year life of the permit.

5.3.1 Timber Harvest

Timber harvest can add to the affected environment via increases to the amount of sediment that enters the waterways, reductions in stream shading from loss of vegetation, and reducing the number of pieces of woody debris that enters streams (NMFS 2008). Based on recent trends, NMFS reasonably expects that, on average, at least one timber harvest project might occur every year during the life of the ten-year permit in the Action Area. While management of timber harvest has improved in recent decades with the onset of the forest practice rules implemented by the California Department of Forestry, legacy effects are likely still affecting environments in the Action Area. These effects include increased sediment loads into streams resulting from conversion of streambeds into roads, and reduced stream complexity by removal of woody debris (NMFS 2008). It is reasonably expected that present and future timber harvest in the Action Area will have much lower adverse environmental effects now that timber harvest projects from the primary landowner in the Action Area are subject to California forest practice rules. Taken with the Proposed Action, the quality of the waterways could slightly degrade. However, the Proposed Action will cumulatively increase survival and abundance of salmon and steelhead.

5.3.2 Water Diversions

Increased water diversions can reduce flows which provides habitat for fish rearing and spawning. Flows for Dry Creek and the Russian River are largely influenced by releases from Lake Sonoma, the reservoir created by WSD. Water diversions from Lake Sonoma to end-users in Sonoma County are expected to change via implementation of the Fish Flow Project required by the 2008 Biological Opinion (NMFS 2008) as proposed by Sonoma Water (SCWA 2016) during the life of the ten-year permit as regulated by the SWRCB. As described in Section 3.1, Dry Creek flows have been altered such that the creek no longer flows intermittently, but rather continually, which has greatly changed habitats for fish found in this environment, including steelhead, coho salmon, and Chinook salmon. Under its water right permit, Sonoma Water is required to maintain minimum stream flows to minimize effects to salmon and steelhead throughout specific reaches on the Russian River and Dry Creek. Minimum flows are expected to decrease in Dry Creek with implementation of the Fish Flow Project and are expected to range from 50 to 105 cfs depending upon the water year type.

Flows in other streams throughout the Action Area are affected by water diversions including direct diversions of surface flow, wells, and groundwater pumping. The SWRCB regulates direct diversions and storage of flow, and issues and monitors water rights for compliance with permits. Recently, the Department of Water Resources developed the Sustainable Groundwater

Management Act, which requires local regulators achieve sustainable groundwater management by 2042, including avoiding significant and unreasonable streamflow depletion. Taken with the Proposed Action, there will be no change to water diversions.

5.3.3 Marijuana Cultivation

Legal and illegal marijuana cultivation occurs throughout the Action Area (Figure 1.2), causing additional water use and increased pollution discharge, and is most prevalent within Mendocino and Sonoma County. Illegal cultivation diverts large amounts of water, dumps pollutants and waste into the environment (*e.g.,* sediment, pesticides, fertilizers, hydrocarbons, heavy metals, *etc.*), damages stream channels, and disturbs soil and forest resources (Bauer *et al.,* 2015). With the passage of Proposition 64 in 2016, which legalized marijuana at the state level, NMFS reasonably expects that marijuana cultivation within the Action Area will continue to occur, both legally and illegally, throughout the ten-year life of the permit. While NMFS is hopeful that present and future adverse environmental effects from marijuana cultivation will be minimized with the legalization process, it is reasonably expected that some of the beneficial effects gained from legalization (*i.e.,* water use and pollution discharge regulations, *etc.*), will be counterbalanced by the environmental degradation from the many remaining illegal and unregulated grow operations that will likely persist into the future (*i.e.,* at least through the lifetime of the 10(a)(1)(a) permit in question). When considered with the Proposed Action, water quality can be expected to be slightly degraded. However, despite these ongoing negative effects, the Proposed Action will cumulatively increase survival and abundance of salmon and steelhead.

5.3.4 CCC Coho Salmon Hatchery Program at Don Clausen Fish Hatchery

The Russian River Coho Salmon Captive Broodstock Program will continue to operate at DCFH. A description of the activities associated with this program can be found in its HGMP (CDFW and USACE 2017).

5.3.5 California Recreational Steelhead Fishery

CDFW maintains a regulated, recreational sport fishery for steelhead that overlaps with all program streams within the action area. Current fishing regulations restrict the steelhead fishery to December 1 through March 7, but only on Saturdays, Sundays, Wednesdays, legal holidays and opening and closing days, and only select portions of each stream are open to fishing. Anglers may only use barbless hooks. In Program streams of the Russian River, two hatchery steelhead adults may be kept per day, which are marked with an adipose fin clip, and all natural-origin steelhead adults must be released.

The Russian River steelhead fishery is expected to continue during the term of the permit for Alternative 2 (No Action – Status Quo Production) and Alternative 3 (Proposed Action) as hatchery production will continue under each. It is likely that the recreational sport fishery in the Russian River for steelhead would be terminated under Alternative 1 (No Action – No Production) to protect naturally produced steelhead.

6 Short- and Long-term Effects by Resource

6.1 Introduction

The following provides an assessment of the short- and long-term effects of each of the Alternatives in combination with the past, present, and foreseeable future actions on each resource analyzed in this EA (i.e., water quantity and quality, salmon and steelhead, other fish species, wildlife, and cultural resources). If there are no anticipated effects from reasonably foreseeable future actions, then there will be no mention of that action in the analysis below.

6.2 Water Quantity and Quality

Water quality within the Russian River basin is expected to remain little changed under all alternatives, both short- and long-term. Within the term of the Permit, the discharge standards for either facility are not expected to change with the implementation of any of the Alternatives. Discharge standards were established for the DCFH by the NCRWQCB through an NPDES permit to address water quality concerns. Within the short-term the discharge standards established NPDES permits for DCFH, and other actions are not expected to change. Therefore, there would be negligible adverse effects from effluent on receiving waters with implementation of the alternatives. Climate change is expected to continue increasing air and water temperatures in California over the short- and long-term. This increase will lead to changes in precipitation patterns and streamside vegetation. However, these changes are expected to have a low adverse effect on water quantity and water quality in the Action Area during the short-term the Permit will be in place. Neither alternative is expected to change short-term conditions as there is little to no consumptive use of water, and the discharge from the hatchery is regulated.

Habitat restoration actions being implemented over the short-term by others will likely help to incrementally improve water quality and quantity by reducing erosion and sediment delivery to streams and improving large wood loading. These activities are expected to have a high beneficial effect locally over the short-term but have low beneficial effect on the basin, long-term.

In summary, there is a high likelihood that there will be low to moderate adverse effects on water quantity and quality from the various activities within the action area in combination with either of the alternatives. Although, Alternative 3 (Proposed Action) is likely to assist in the restoration of salmon populations that were lost due to past degradation of water resources, habitat restoration will likely offset some potential adverse effects over the long-term.

6.3 Salmon and Steelhead

The climate influences freshwater stream temperature and flow. Because salmon and steelhead depend upon these streams during different stages of their life history cycle, their populations are likely to be affected by climate change (Table 16). Changes in temperature, rainfall, snowpack, and vegetation are likely to have high adverse effects on salmon and steelhead populations over

the long-term (NMFS 2008; NMFS 2012). Physical characteristics of river and stream environments found along the West Coast, which include the action area, are expected to be altered from climate change. In the recent past "California has experienced 1) below average precipitation, 2) record high surface air temperatures, and 3) record low snowpack (NMFS 2016a). These environmental changes that are expected to occur from climate change are likely to disrupt the natural distribution, behavior, growth, and survival of salmon and steelhead throughout the action area.

Salmon and steelhead population abundance naturally alternates between higher and lower levels on temporal and spatial patterns that may last decades or centuries and on more complex ecological scales than can be easily observed (Rogers et al. 2013). The effects of climate change on salmon and steelhead are described in general in ISAB (2007) and are variable among species and life history stages (Table 15). Long-term changes in streamflow and water temperature resulting from climate change would likely affect both natural-origin and hatchery-origin salmon and steelhead. Under all of the analysis alternatives moderate level of adverse effects on salmon and steelhead from climate change are expected to be similar because climate change would affect fish habitat under each alternative in the same manner. However, while climate change is reasonably likely to place additional stress on the conservation and recovery of the CCC steelhead DPS, NMFS does not expect that long-term climate change effects will be significant such that it has an appreciable effect on the CCC steelhead DPS, CCC Coho Salmon ESU or CC Chinook ESU during the ten-year life of the permit.

6.4 Other Fish Species

Like salmon and steelhead, other fish species (Table 5) may also be negatively affected by climate change, water diversions, and resource extractions such as logging from timber harvest and marijuana cultivation due to the potential loss and degradation of their aquatic habitat and/or their inability to adapt to the changing conditions. Habitat improvement projects implemented in the basin over the short- and long term to improve salmon productivity and abundance are likely to benefit other fish species. However, the gain from such habitat actions may be negated over the long-term due to climate change.

Table 16. Examples of potential effects of climate change on salmon and steelhead life stages and life history periods.

Life Stage	Potential Effects
Egg	● Increased water temperatures and decreased flows during spawning migrations would increase pre-spawn mortality and reduce egg deposition for some species. ● Increased water temperatures would increase maintenance metabolism, leading to smaller fry. ● Increased water temperatures would result in faster embryonic development, leading to earlier hatching. ● Increased mortality for some species because of more frequent winter flood flows. ● Lower flow would decrease access to or availability of spawning areas.
Juvenile	● Faster yolk utilization from increased water temperatures may lead to early emergence.

(Spring and Summer Rearing)	● Smaller fry are expected to have lower survival rates. ● Growth rates would be slower if food is limited. ● Lower flows would decrease habitat capacity. ● Sea level rise would eliminate or diminish the tidal wetland capacity.
Juvenile (Overwinter Rearing)	● Smaller size at start of winter is expected to result in lower winter survival. ● Mortality would increase because more frequent floods. ● Warmer winter temperatures would lead to higher metabolic demands, which may decrease winter survival if food is limited, or increase winter survival if growth and size are enhanced. ● Warmer winter temperatures may increase predator activity/hunger, which can decrease winter survival.
Juvenile and Adult (Out-Migration)	● Earlier snowmelt and warmer temperatures may cause earlier emigration to the estuary and ocean either during favorable upwelling conditions, or prior to the period of favorable ocean upwelling. ● Increased predation risk in the mainstem because of higher consumption rates by predators at the elevated spring water temperatures.
Adult	● Increased water temperatures may delay fish migration. ● Increased water temperatures may also lead to more frequent disease outbreaks as fish become stressed and crowded.

Sources: Glick et al. 2007, ISAB 2007, Beamish et al. 2009, Beechie et al. 2013

6.5 Wildlife

Adverse long-term effects from climate change, and resource extraction are expected to negatively affect wildlife (Table 6) in ways like those described above for salmon and steelhead. These adverse effects are reasonably likely to be somewhat mitigated by current and future habitat restoration efforts in the action area together with the Proposed Action.

Under Alternative 1 (No Action – No Production), the contribution of eggs, fry, juveniles, and adults the Program currently produces that benefit wildlife that prey on these various salmon life stages will not occur over the short-term. The benefits to wildlife remain like past levels under Alternative 2 (No Action – Status Quo Production) and would be reduced in Alternative 3 (Proposed Action), at least short-term.

6.6 Cultural Resources

Adverse short- and long-term effects from climate change, resource extraction, and habitat restoration are not expected to have a negative effect on the cultural resources listed above in Section 3.8.

All analysis alternatives avoid impacts to culturally important sites in the Action Area. Alternative 2 (No Action – Status Quo Production) would result in no change from current conditions, and furthermore would not result in effects to cultural resources. Under Alternative 3 (Proposed Action), beneficial effects may occur to cultural uses and tribal trust assets throughout the action area from increased abundance of CCC Coho Salmon, CC chinook, and other fish species. Alternative 1 (No Action – No Production) may increase short-term extirpation risk to CCC steelhead in the Russian River, resulting in high adverse effect to this culturally important resource.

7 AGENCIES AND PERSONS CONSULTED

7.1 Tribes

The following tribes were consulted during the development of the EA:

- Chicken Ranch Rancheria of Me-Wuk Indians of California
- Cloverdale Rancheria of Pomo Indians of California
- Coyote Valley Band of Pomo Indians of California
- Dry Creek Rancheria Band of Pomo Indians, California
- Federated Indians of Graton
- Hopland Band of Pomo Indians, California
- Kashia Band of Pomo Indians of the Stewarts Point Rancheria, California
- Koi Nation of Northern California
- Lytton Rancheria of California
- Manchester Band of Pomo Indians of the Manchester Rancheria, California
- Pinoleville Pomo Nation, California
- Potter Valley Tribe, California
- Robinson Rancheria Band of Pomo Indians, California
- Redwood Valley or Little River Band of Pomo Indians of the Redwood Valley Rancheria California

7.2 National Marine Fisheries Service

NMFS staff and contractors that developed the EA are:

- Kevin Malone (NMFS Contractor – Saltwater Inc.)
- Bob Coey (NMFS)
- Elif Wilkins (NMFS)
- Tom Daugherty (NMFS)
- Jodi Charrier (NMFS)
- Erin Seghesio (NMFS)

8 LITERATURE CITED

53 FR 43884. Determination of Endangered Status for California Freshwater Shrimp. Federal Register 53: 43884 – 43889. October 31, 1988.

59 FR 5498. Endangered and Threatened Wildlife and Plants: Determination of Endangered Status of the Tidewater Goby. 57: 5494-5500. February 4, 1994.

59 FR 8745. Endangered and Threatened Wildlife and Plants: Designation of Critical Habitat for Tidewater Goby. Federal Register 59: 8745-8819. February 6, 2013.

61 FR 56138. Final rule: Endangered and threatened species: Threatened status for central California Coho Salmon evolutionary significant unit (ESU). Federal Register 61: 56138-56149. October 1996.

62 FR 43937. Endangered and Threatened Species: Listing of Several Evolutionary Significant Units 9ESUs) of West Coast Steelhead. Federal Register 62: 43937-43954. October 17, 1997.

64 FR 24049. Final Rule and Correction: Designated Critical Habitat for Central California Coast and Southern Oregon/Northern California Coasts Coho Salmon. Federal Register 64: 24049-24062. May 5, 1999.

64 FR 50394. Final Determination. Endangered and Threatened Species; Threatened Status for Two Chinook Salmon Evolutionary Significant Units (ESUs) in California. Federal Register 64: 50394 - 50415. September 1999.

70 FR 37160. Endangered and Threatened Species: Final Listing Determination for 16 ESUs of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Federal Register 70: 37160- 37204. June 28, 2005.

70 FR 52488. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionary Significant Units of Pacific Salmon and Steelhead in California; Final Rule. Federal Register 70: 52488-52627. September 2, 2005.

71 FR 834. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Populations Segments of West Coast Steelhead. Federal Register 71: 834-862. January 5, 2006.

74 FR 52300. Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for Threatened Southern Distinct Population Segment of North American Green Sturgeon; Final Rule. Federal Register 74: 52300-52351. October 9, 2009.

78 FR 8745. Endangered and Threatened Wildlife and Plants: Designation of Critical Habitat for Tidewater Goby. Federal Register 59: 8745-8819. February 6, 2013.

87 FR 73288. Endangered and Threatened Species; Take of Anadromous Fish: Notice of receipt of one permit application for enhancement and monitoring purposes, including an associated Hatchery and Genetic Management Plan, and notice of availability of a draft environmental assessment. Federal Register 87: 73288-73290. November 29, 2022.

Adams, P.B., M. J. Bowers, H.E. Fish, T.E. Laidig, and K.R. Silberberg. 1999. Historical and Current Presence-Absence of Coho Salmon (*Oncorhynchus kisutch*) in the Central California Coast Evolutionarily Significant Unit. Southwest Fisheries Science Center National Marine Fisheries Service. April 1999. 28 pages.

Bauer S, Olson J, Cockrill A, van Hattem M, Miller L, Tauzer M, et al. (2015) Effects of Surface Water Diversions for Marijuana Cultivation on Aquatic Habitat in Four Northwestern California Watersheds. PLoS ONE 10(3): e0120016. https://doi.org/10.1371/journal.pone.0120016

Beamish, R.L., B.E. Riddell, K.L. Lange, E. Farely Jr., S. Kang, T. Nagasawa, V. Radchenko, O. Temnykh, and S. Urawa. 2009. The Effects of Climate on Pacific Salmon - a Summary of Published Literature. North Pacific Anadromous Fish Commission (Npafc) Special Publication No. 1. Published Literature. 11 pages.

Beechie, T., H. Imaki, J. Greene, A. Wade, H. Wu, J. Kimball, J. Stanford, G. Pess, P. Roni, P. Kiffney, and N. Mantua. 2013. Restoring Salmon Habitat for a Changing Climate. River Research and Applications 29(8):939-960.

Bjorkstedt, E.P., B.C. Spence, J.C. Garza, D.G. Hankin, D. Fuller, W.E. Jones, J.J. Smith, and R. Macedo. 2005. An analysis of historical population structure for evolutionarily significant units of Chinook salmon, coho salmon, and steelhead in the north-central California coast recovery domain. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center. 210 pages.

Brown, L.R., P.B. Moyle, and R.M. Yoshiyama. 1994. Historical decline and current status of coho salmon in California. North American Journal of Fisheries Management. 14(2):237-261.

CA HSRG (California Hatchery Scientific Review Group). 2012. California Hatchery Review Statewide Report. Prepared for the US Fish and Wildlife Service and Pacific States Marine Fisheries Commission. April 2012.

California Department of Fish and Wildlife (CDFW), and United States Corps of Engineers (USACE). 2017. Hatchery and Genetic Management Plan: Don Clausen Fish Hatchery,

Russian River Coho Salmon Captive Broodstock Program. Prepared for the National Marine Fisheries Service, Santa Rosa, California.

California Sea Grant. 2021. Russian River Coho Salmon and Steelhead Monitoring Report: Winter 2020/21. Windsor, CA.

Glick, P., J. Clough, and B. Nunley. 2007. Sea-Level Rise and Coastal Habitats in the Pacific Northwest: An Analysis for Puget Sound, Southwestern Washington, and Northwestern Oregon. National Wildlife Federation. 106p.

HSRG (Hatchery Scientific Review Group). 2014. On the science of hatcheries: An updated perspective on the role of hatcheries in salmon and steelhead management in the Pacific Northwest.

ISAB (Independent Science Advisory Board). 2007. Climate Change Effects on Columbia River Basin Fish and Wildlife. May 11, 2007. Report ISAB 2007-2. Northwest Power and Conservation Council, Portland, Oregon. 146 pages.

National Marine Fisheries Service (NMFS) 2001. Endangered Species Act Section 7 biological opinion on the issuance of a modification to Section 10(a)(1)(A) permit 1067 for scientific research and the purpose of enhancing the propagation or survival of threatened Central California Coast Coho Salmon (*Oncorhynchus kisutch*). NMFS Southwest Region, Santa Rosa, California.

NMFS (National Marine Fisheries Service). 2005. Endangered and threatened species; designation of critical habitat for 12 evolutionarily significant units of West Coast salmon and steelhead in Washington, Oregon, and California. Final rule. Federal Register 70:170(2 September 2005):52630-52858.

NMFS (National Marine Fisheries Service). 2008. Biological Opinion Water Supply, Flood Control Operations, and Channel Maintenance Conducted by the U.S. Army Corp of Engineers, the Sonoma County Water Conservation Improvement District in the Russian River Watershed for September 24, 2008, to September 24, 2023. NMFS Southwest Region, Long Beach, California.

NMFS (National Marine Fisheries Service). 2012. Final Recovery Plan for the Central California Coast Coho Salmon Evolutionary Significant Unit. National Marine Fisheries Service, Southwest Region, Santa Rosa, California.

NMFS (National Marine Fisheries Service). 2016a. Final Coastal Multispecies Recovery Plan. National Marine Fisheries Service, West Coast Region, Santa Rosa, California.

NMFS (National Marine Fisheries Service). 2016b. 5-year Status Review: Central California Coast Coho Salmon. National Marine Fisheries Service, West Coast Region, Santa Rosa, California.

NMFS (National Marine Fisheries Service). 2016c. 5-year Status Review: Central California Coast Steelhead. National Marine Fisheries Service, West Coast Region, Santa Rosa, California.

NMFS (National Marine Fisheries Service). 2020a. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act, Essential Fish Habitat. Issuance of ESA 10(a)1(A) Enhancement Permit to the U.S. Corps of Engineers, San Francisco District for the Operation of the Russian River Coho Salmon Captive Broodstock Program and Accompanying Hatchery and Genetic Management Plan.

NMFS (National Marine Fisheries Service). 2020b. Final Environmental Assessment: Issuance of an Endangered Species Act Section 10(a)(1)(A) Permit to the United States Army Corps of Engineers for Operation of the Russian River Coho Salmon Captive Broodstock Program at the Don Clausen Fish Hatchery.

Pearsons, T.N. 2011Final Environmental Assessment: A Tool for Assessing and Reducing Ecological Risks of Hatchery Operations in Freshwater. Environmental Biology of Fishes 94(1):45-65. DOI:10.1007/s10641-011-9926-8

Rogers, L.A., D.E. Schindler, P.J. Lisi, G.W. Holtgrieve, P.R. Leavitt, L. Bunting, B.P. Finney, D.T. Selbie, G. Chen, I. Gregory-Eaves, M.J. Lisac, and P.B. Walsh. 2013. Centennial-Scale Fluctuations and Regional Complexity Characterize Pacific Salmon Population Dynamics over the Past Five Centuries. PNAS 110(5):1750-1755.

Sonoma Water and California Sea Grant. 2019. Implementation of California Coastal Salmonid Population Monitoring in the Russian River Watershed. Santa Rosa, CA. 72 pp. + Appendices.

Unites States Corps of Engineers and California Department of Wildlife. 2021. Hatchery and Genetic Management Plan – Russian River Steelhead Integrated Harvest Hatchery Program, California. U.S. Department of Commerce. NOAA

United States Fish and Wildlife Service (USFWS). 1998. Recovery Plan for the California Freshwater Shrimp (*Syncaris pacifica*).

Williams, T.H., B.C. Spence, D.A. Boughton, R.C. Johnson, L. Crozier, N. Mantua, M. O'Farrell, and S. T. Lindley. 2016. Viability Assessment for Pacific salmon and steelhead listed under the Endangered Species Act: Southwest, 2 February 2016 Report to National Marine Fisheries Service – West Coast Region from Southwest Fisheries Science Center, Fisheries Ecology Division 110 Shaffer Road, Santa Cruz, California.

9 APPENDIX A

Russian River Steelhead Hatchery Genetic Management Plan

10 FINDING OF NO SIGNIFICANT IMPACT

(see next page)

FINDING OF NO SIGNIFICANT IMPACT

I. Purpose of Finding of No Significant Impact (FONSI): The National Environmental Policy Act (NEPA) requires the preparation of an Environmental Impact Statement (EIS) for any proposal for a major federal action significantly affecting the quality of the human environment. 42 U.S.C. § 4332(C). The Council on Environmental Quality (CEQ) Regulations direct agencies to prepare a FONSI when an action not otherwise excluded will not have a significant impact on the human environment. 40 CFR §§ 1500.4(b) & 1500.5(b). To evaluate whether a significant impact on the human environment is likely, the CEQ regulations direct agencies to analyze the potentially affected environment and the degree of the effects of the proposed action. 40 CFR § 1501.3(b). In doing so, agencies should consider the geographic extent of the affected area (i.e., national, regional or local), the resources located in the affected area (40 CFR § 1501.3(b)(1)), and whether the project is considered minor or small-scale (NAO 216-6A CM, Appendix A-2). In considering the degree of effect on these resources, agencies should examine both short- and long-term effects (40 CFR § 1501.3(b)(2)(i); NAO 216-6A CM Appendix A-2 - A-3), and the magnitude of the effect (e.g., negligible, minor, moderate, major). CEQ identifies specific criteria for consideration. 40 CFR § 1501.3(b)(ii)-(iv). Each criterion is discussed below with respect to the proposed action and considered individually as well as in combination with the others.

In preparing this FONSI, we reviewed the Environmental Assessment (EA) for the Russian River Steelhead Integrated Harvest Hatchery Program. The EA evaluates the Issuance of an Endangered Species Act (ESA) Section 10(a)(1)(A) Enhancement Permit to the United States Corps of Engineers (USACE) for Operation of the Russian River Steelhead Program. The EA evaluates the affected area, the scale and geographic extent of the proposed action, and the degree of effects on those resources (including the duration of impact, and whether the impacts were adverse and/or beneficial and their magnitude). The EA is hereby incorporated by reference. 40 CFR § 1501.6(b).

II. Approach to Analysis:

A. *State if a project is determined to be small-scale or minor, and therefore, the scale of the project is not considered to meaningfully contribute to a significant impact.*

We have determined that the proposed action to be small-scale, or minor. Impacts from the program are expected to be minimal as hatchery supplementation has been ongoing since 1980 at similar steelhead production levels. The proposed program will initially decrease steelhead production until production and genetic performance metrics are achieved. Additionally, a robust monitoring and evaluation program is required to identify, monitor, and address any adverse impacts that may arise.

B. *State if the proposed action will not cause an effect to a specific resource. If an impact is determined to be negligible, minor or moderate, it is not considered to meaningfully contribute to a significant impact. The EA should have defined these terms.*

As described below, the proposed action will not meaningfully significantly impact specific resources in the affected area. The ESA Section 10(a)(1)(A) Enhancement Permit for the

operation of the Russian River steelhead hatchery program has limited impacts on ESA-listed salmonids and negligible impacts on the habitat.

C. State if a proposed action is not connected to other actions that have caused or may cause effects to resources in the affected area, and there is then no potential for the effects of the proposed action to add to the effects of other projects such that the effects taken together could be significant.

The proposed action is not connected to other actions that have caused or may cause effects to resources in the affected area. As such, there is no potential for the effects of the proposed action to add to the effects of other projects such that the effects taken together could be significant.

III. Geographic Extent and Scale of the Proposed Action:

The scale of the proposed action is regional, small-scale, and constrained to within the Russian River watershed. The geographic extent includes the location of activities described in the Hatchery Genetic Management Plan (HGMP) and associated production facilities, consisting of the Don Clausen Fish Hatchery (DCFH) and Coyote Valley Fish Facility (CVFF). DCFH is located on Dry Creek at the base of Warm Springs Dam, within Sonoma County, California. CVFF is 42 miles north of the DCFH facility on the East Fork Russian River at the base of Coyote Valley Dam in Mendocino County, California.

IV. Degree of Effect

A. The potential for the proposed action to threaten a violation of Federal, State, or local law or requirements imposed for environmental protection.

The EA evaluated the proposed HGMP and determined it will not violate federal, state, or local laws or requirements imposed for environmental protection. Review of the HGMP was conducted to ensure ESA compliance pursuant to the Section 10(a)(1)(A) Enhancement Permit and by the California Department of Fish and Wildlife (CDFW) and the California North Coast Regional Water Quality Control Board for compliance with federal, state, and local environmental laws and regulations.

B. The degree to which the proposed action is expected to affect public health or safety.

The proposed action is not expected to substantially impact public health or safety. The hatchery complies with all federal Occupational Safety and Health Administration policies and state requirements for public and worker safety. Discharge from the hatchery will follow regulations associated with the National Pollutant Discharge Elimination System (permit #CA0024350/I.D. No. 1B84034050N) granted to the Hatchery. See the HGMP (Sec. 4) and EA for details.

C. The degree to which the proposed actions is expected to affect a sensitive biological resource, including:

a. Federal threatened or endangered species and critical habitat;

The proposed project is unlikely to significantly impact federal ESA-listed species and their critical habitat. The biological opinion evaluated impacts to ESA-listed species and determined the action is not likely to have adverse impacts to critical habitat within the program area, and although we do anticipate some minor adverse impacts to ESA-listed endangered Central California Coast (CCC) coho salmon, ESA-listed threatened California Coastal Chinook, and

ESA-listed threatened CCC steelhead. These impacts are required to be monitored, evaluated, and adaptively managed to minimize and avoid major adverse impacts. Potential predation by hatchery-released steelhead smolts upon CCC coho salmon juveniles has been minimized by changing the location of the hatchery steelhead releases to minimize overlap in these species. In addition, the overall production of steelhead by the program has been reduced until performance targets identified in the HGMP to reduce other adverse impacts are met. The remaining likely impacts from the Program will be beneficial impacts through increased integration of native wild fish into the Program, thereby conserving, improving, and maintaining the genetic variability within both stocks (hatchery and wild populations) of the species.

b. stocks of marine mammals as defined in the Marine Mammal Protection Act;

The proposed action is not reasonably expected to adversely affect stocks of marine mammals. There is no associated recreational or commercial fishery, which may result in bycatch or take of marine mammals. Additionally, hatchery produced steelhead trout may be prey items to marine mammals and may provide a beneficial impact by increasing the potential food base. The Program proposes to facilitate recovery and thereby increase overall steelhead abundance in river and ocean food webs, supplementing marine mammal diets.

c. essential fish habitat (EFH) identified under the Magnuson–Stevens Fishery Conservation and Management Act (MSA);

An EFH consultation on the proposed HGMP was conducted for potential adverse effects to EFH pursuant to Section 305(b)(2) of the MSA and determined that any adverse effects were minimal, spatially and temporally. The identified impacts to EFH are competition between program fish and wild fish. The proposed HGMP would provide some benefits to EFH by subsidizing stream habitat with marine nutrients through the decomposition of ocean returning adult steelhead carcasses.

d. bird species protected under the Migratory Bird Treaty Act;

The proposed action is not expected to interfere with the feeding, nesting or migratory birds in any manner and therefore would not significantly affect bird species protected under the Migratory Bird Treaty Act.

e. national marine sanctuaries or monuments;

The proposed action would not have any effect on national marine sanctuaries or monuments.

f. vulnerable marine or coastal ecosystems, including, but not limited to, shallow or deep coral ecosystems;

The proposed action will not have any impacts on vulnerable marine or coastal ecosystems. The hatchery is not located near any of these ecosystems. The steelhead released from the program may transit or forage in vulnerable marine or coastal ecosystems. However, since they are a non-invasive species, their presence and impacts within each ecosystem are likely beneficial.

g. biodiversity or ecosystem functioning (e.g., benthic productivity, predator-prey relationships, etc.)

The proposed action is not expected to significantly adversely affect the biodiversity or ecosystem functions of the Russian River and coastal marine ecosystems. Steelhead are native fish to the action area, and the proposed action will likely result in beneficial impacts to

biodiversity and ecosystem functions of the Russian River, coastal watersheds of Northern California, and Coastal California marine ecosystems.

D. *The degree to which the proposed action is reasonably expected to affect a cultural resource: properties listed or eligible for listing on the National Register of Historic Places; archeological resources (including underwater resources); and resources important to traditional cultural and religious tribal practice.*

During the action term, the total adult steelhead production in the action area is expected to be lower than Alternative 2 (No Action – Status Quo Production) but higher than Alternative 1 (No Action – No Production). The reduction of adult steelhead production at the hatchery may temporarily result in fewer fish available for tribal harvest (until performance targets are achieved, and maximum production is restored). However, due to the traditionally high surplus of adults, in excess of recent harvest trends reported by CDFW, and due to the tribes reporting catching few, if any, steelhead in the action area, the decrease in hatchery production is expected to have negligible adverse effects on this cultural resource. Additionally, no properties listed or eligible for listing on the National Register of Historic Places or archeological resources are known to occur in the area where the proposed action will occur.

E. *The degree to which the proposed action has the potential to have a disproportionately high and adverse effect on the health or the environment of minority or low-income communities, compared to the impacts on other communities (EO 12898).*

The proposed action would likely have no adverse effect on the health or the environment of minority or low-income communities. The communities of Rio Nido, California (Census Track 1537.10) and Guerneville, California (Census Track 1537.08) qualify as low-income in the project area[1]. The communities are in the lower Russian River. Some residents from these communities may catch steelhead during fishing season. With issuance of the permit, there will be a temporary 20 percent decrease in hatchery steelhead production, leading to a 20 percent decrease in adult steelhead available for harvest in the sport fishery. This typically might result in a reduction to the sport fish catch overall and potentially a moderate adverse impact on the two low-income communities, depending on the number of people that fish for steelhead. However, due to the traditionally high surplus quantity of uncaught adult fish, which has occurred in high excess to recent harvest trends reported by CDFW, this potential adverse effect is not expected to occur. Once performance targets are met, which are intended to reduce biological impacts to listed steelhead and other listed salmonids (identified above), will improve the genetic integrity of the hatchery fish, and the trajectory of the interaction of these two populations, which accomplishes integration, hatchery production may be increased back to the original maximum production limit. Until then, a potential 20 percent decrease in harvest is speculative, and will be evaluated by CDFW via harvest reporting and a new creel census to improve and verify harvest data.

F. *The degree to which the proposed action is likely to result in effects that contribute to the introduction, continued existence, or spread of noxious weeds or nonnative invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of the species.*

[1] According to Tax Code 45D(e) and based on the 2020 Census data. Arc GIS Map: https://www.arcgis.com/apps/instant/sidebar/index.html?appid=0e980a986c6545a9b4eeb8fc35cebf5d

The proposed action contains no new actions which are expected to result in effects that contribute to the introduction, continued existence, or spread of noxious weeds or nonnative invasive species known to occur in the area, or that may promote the introduction, growth, or expansion of the range of the species. Established federal and state guidelines will be followed to minimize the introduction, continued existence, or spread of noxious weeds or nonnative invasive species known to occur in the area.

The detection of New Zealand Mud Snails (NZMS) at the DCFH adjacent to Lake Sonoma dam and at the outlet of CVFF adjacent to Lake Mendocino dam in 2023, has prompted CDFW's steelhead program to redouble its efforts to avoid the spread of this aquatic invasive species. To ensure this, steelhead plantings continue to be limited to traditional areas that are already NZMS positive. Steelhead plantings are supported by NZMS presence confirmation surveys in advance of releases. CDFW will continue to operate consistent with all federal and state policies, including conforming to the National Pollution Discharge Elimination and Aquatic Invasive Species testing and reporting requirements. In addition, CDFW will explore eradication procedures to eliminate NZMS from all facilities as well as the waters and equipment used for transport, to broaden the list of waters eligible to receive steelhead in the future.

G. *The potential for the proposed action to cause an effect to any other physical or biological resources where the impact is considered substantial in magnitude (e.g., irreversible loss of coastal resource such as marshland or seagrass) or over which there is substantial uncertainty or scientific disagreement.*]

The proposed action is not expected to cause a substantial effect to any other physical or biological resource, nor is there a substantial uncertainty or scientific disagreement on the impacts of the proposed action.

V. Other Actions Including Connected Actions:

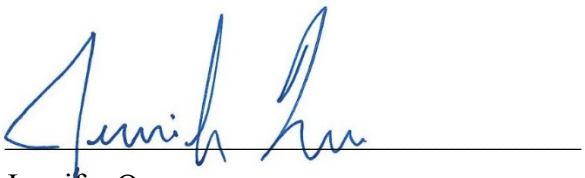
The proposed action would not add to the effects of other actions that have occurred, are occurring, or are reasonably certain to occur in the Russian River watershed. The EA determined that the short and long-term effects, both beneficial, negligible, and potentially adverse, of the proposed action on the affected resources, in combination with effects from past, present, and foreseeable future actions on the same affected resources, would not be expected to be significant.

VI. Mitigation and monitoring:

The proposed action was developed to be consistent with the requirements of the ESA, MSA, and other applicable laws. The USACE and CDFW propose monitoring to quantify program effects to ESA-listed salmon species and inform the Technical Advisory Committee on the program's progress and the need for additional actions to achieve performance metrics. The HGMP provides a framework for the breeding, rearing, releasing, and associated monitoring and evaluation activities.

DETERMINATION

The CEQ NEPA regulations, 40 CFR § 1501.6, direct an agency to prepare a FONSI when the agency, based on the EA for the proposed action, determines not to prepare an EIS because the action will not have significant effects. In view of the information presented in this document and the analysis contained in the supporting EA prepared to evaluate the Russian River Steelhead Integrated Harvest Hatchery Program, it is hereby determined that the issuance of an ESA Section 10(a)(1)(A) Enhancement Permit for USACE to operate the Russian River Steelhead Program will not significantly impact the quality of the human environment. The Russian River Steelhead Integrated Harvest Hatchery Program EA is hereby incorporated by reference. In addition, all beneficial and adverse impacts of the proposed action as well as mitigation measures have been evaluated to reach the conclusion of no significant impacts. Accordingly, preparation of an EIS for this action is not necessary.



March 6, 2024

Jennifer Quan

Date

Regional Administrator

West Coast Region

National Marine Fisheries Service