Endangered Species Act Section 7(a)(2) Biological Opinion for the Issuance of an ESA Section 10(a)(1)(A) Enhancement Permit to the Monterey Peninsula Water Management District for Implementation of the Rescue and Rearing Management Plan for the Carmel River Steelhead Rescue and Rearing Enhancement Program

National Marine Fisheries Service Consultation Number: WCRO-2019-02285

Action Agency: NOAA's National Marine Fisheries Service

Table 1. Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely To Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Southern Central California Coast steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	No	No

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

Issued By:

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Date: August 29, 2019

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviation	Full Name
AF	acre-feet
APPS	Authorizations and Permits for Protected Species
ASR	Aquifer Storage and Recovery
BMI	Benthic Macroinvertebrate Indices
Box Trap	Fyke Style Downstream Box Trap
Opinion	Biological Opinion
CC-RWQCB	Central California Regional Water Quality Control Board
CAW	California-American Water Company
CDFW	California Department of Fish and Wildlife
cfs	Cubic feet per second
CMP	Coastal Monitoring Plan
District	Monterey Peninsula Water Management District
DQA	Data Quality Act
DPS	Distinct Population Segment
EDL	Effective Diversion Limit
ESA	Endangered Species Act
Facility	Sleepy Hollow Steelhead Rearing Facility
FEIR	Final Environmental Impact Report
GWR	Groundwater Replenishment Project
HSA	Hydrologic Sub-areas
ITP	Incidental Take Permit
ITS	Incidental Take Statement
LPD	Los Padres Dam
LPR	Los Padres Reservoir
LWD	Large Woody Debris
MDN	Marine-Derived Nutrients
MOA	Memorandum of Agreement
NMFS	National Marine Fisheries Service
NOAA	National Oceanic Atmospheric Administration

Acronym or Abbreviation	Full Name
NPDES Permit	National Pollutant Discharge Elimination System Permit
SWFSC	NMFS Southwest Fisheries Science Center
PBF	Physical or Biological Features
PCEs	Primary Constituent Elements
PCTS	Public Consultation Tracking System
GWR Project	Pure Water Monterey Groundwater Replenishment Project
OCRD	Old Carmel River Dam
RPMs	Reasonable and Prudent Measures
RRMP	Rescue and Rearing Management Plan
RM	River Mile
SCD	San Clemente Dam
SHSRF	Sleepy Hollow Steelhead Rearing Facility
S-CCC	South-Central California Coast
SWFSC	NMFS Southwest Fisheries Science Center
SWRCB	State Water Resources Control Board Order
TSS	Total Suspended Solids
VSP	Viable Salmonid Population
WY	Water Year
WCR	West Coast Region
YOY	Young-of-the-year

1 INTRODUCTION

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

1.1 Background

NOAA's National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR Part 402.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). A complete record of this consultation is on file at NMFS Santa Rosa, CA.

The primary objective of the Monterey Peninsula Water Management District's (District) rescue and relocation program (hereafter referred to as "Program") is to assist in the restoration, conservation, and maintenance of the Carmel River steelhead population to viable levels in the Carmel River watershed as mitigation for environmental impacts caused by diversion of surface and subsurface streamflow in the lower 24 miles of the mainstem Carmel River and subunits of the Carmel Valley Alluvial Aquifer. The program began before the 1997 ESA listing of S-CCC steelhead as a threatened species, as a mitigation requirement proposed by the District in the 1990 Environmental Impact Report (EIR) for their Water Allocation Program. When S-CCC steelhead were listed in 1997, the District submitted its first Section 10(a)(1)(A) application to NMFS. Because of NMFS staffing constraints technical assistance with the permitting of the Program did not begin until 2005. From 2017-2019, NMFS and the District finalized the Section 10(a)(1)(A) permit application and Rescue and Rearing Management Plan (RRMP).

1.2 Consultation History

NMFS received a Section 10(a)(1)(A) permit application from the District for the Program on February 8, 2018. The District requested a permit to rescue, transport, rear and release wild S-CCC steelhead from the mainstem of the Carmel River and its tributaries that are dewatered by water withdrawals. The permit application was supplemented by the RRMP, which details current and proposed operations and monitoring. NMFS reviewed the permit and RRMP and deemed it sufficient on May 4, 2018. On June 4, 2018, NMFS provided notice of our receipt of the Section 10(a)(1)(A) permit application and RRMP in the Federal Register, which also initiated a 30 day public comment period. NMFS reviewed all comments, conducted extensive literature reviews, consulted with fish culturists, analyzed stocking data in order to address comments and devised a suite of recommendations for the District to consider implementing to improve the program. As a result, the District made modifications to the project which we have incorporated into Section 1.3 of the opinion. In addition, section addendums were made for the RRMP to update any information that was out of date. As the federal action agency for the issuance of the section 10(a)(1)(A) permit, NMFS initiated internal section 7 consultation for the operation of the Program on August 20, 2019.

1.3 Proposed Federal Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). The action is NMFS' issuance of an ESA 10(a)(1)(A) enhancement permit to the District to rescue, transport, rear and release steelhead from the drying reaches of the Carmel River and its tributaries. As described below, some rescued fish would be reared at the Sleepy Hollow Steelhead Rearing Facility (Facility) before release. The District is requesting and NMFS is proposing to issue a 5 year permit for this action (2019-2024). By 2023, alternative water sources are expected to be active, reducing the need to withdraw water from the Carmel River at current rates. At that point, the District will reevaluate the need and scope of the program.

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

1.3.1 Rescue Protocols

1.3.1.1 Criteria to Start Rescues

Mainstem rescues are initiated when flows decline below 8 cubic feet per second (cfs) at the Highway 1 Bridge Gaging Station. Under most circumstances, the start trigger provides adequate time for conducting rescues from downstream to upstream; allowing for two to four rescue passes through each reach as it dries back. Tributary rescues will commence when they are hydrologically disconnected from the river mainstem. Exceptions to these rescue triggers may occur during critically-dry water years when flows decline rapidly during the late spring. In these situations, the District initiates early rescues by installing and operating a fyke style downstream box trap (box trap).

1.3.1.2 Capture Methodology

During rescues, whenever possible, the District will use a combination of small-mesh seines with electrofishing machines to capture as many steelhead as possible by first seining, and then if necessary herding the fish with the electrofishing machine into seines stationed at the bottom of riffles or at the top or bottom of pools. This technique is designed to reduce exposure of fish to the strongest portion of the electric field and minimize the risk of electro-induced injuries.

The seines used have a ¼-inch stretch mesh and will be used in deep run and pool habitat units when water quality permits. Seines will not be pulled through pools with large amounts of algae or when there is concern for water-quality degradation caused by the seining event. Seines will be checked for holes and fixed accordingly.

Electrofishing units will be tested and recalibrated at least every other year and then overhauled, if necessary, at the interval specified by the manufacturer. The District follows the electrofishing protocol recommended by NMFS (2000). Electrofishing sessions will begin with all settings (voltage, pulse width, and pulse rate) at the minimums needed to capture fish. Settings will be increased as needed in the field only to the point where fish are immobilized and captured. Block nets will be placed below the area being rescued whenever it will significantly enhance capture efficiency.

The box trap is used infrequently, during extended drought periods or very early season river dry back as described above. All steelhead attempting to emigrate downstream in the drying reaches will be captured in the box trap, sorted into adults, smolts, and non-smolts. Adults and smolts are transported downstream to the lagoon. Juveniles are transported back upstream into perennial habitat. The box trap is made of an algae/debris screen (passes fish, yet screens out filamentous algae) leading into a large funnel-shaped fence across the river channel, ending in a fyke-frame/net that leads to a 10-inch diameter, 20-foot (ft) long flexible pipe. The pipe discharges fish and a small amount of filtered water into a 4ft x 4ft x 2.5ft live box.

1.3.1.3 Criteria to Stop Rescues

By conducting fish rescues during low-flow conditions in late-spring/summer, water temperature, dissolved oxygen, and conductivity on many days may be above optimal conditions for handling fish. The primary reasons to cease or not initiate fish rescues within a particular river reach are chronically poor water quality, conditions hazardous to human health, and subjecting steelhead to numerous repetitive rescue efforts. Chronically poor water quality often occurs at the end of the rescue season or during the last pass through a section where the stream is about to completely dry. These water quality conditions become tenuous for survival of the remaining steelhead. Conditions hazardous to human health occur every few years. The District will encounter a stretch of the river where non-point source run-off, septic-tank seepage, or an illegal dumping incident make it unwise to risk further water contact.

In some instances, circumstances will render rescues too risky or ineffective to pursue. For example, when daily fish rescue counts within a reach do not decline with each collection pass, yet stream flow and water quality conditions continuously degrade, the District assumes the remaining fish have been chronically or even terminally stressed, negating the need to rescue them. The District has observed that fish rescued from such conditions tend to suffer immediate mortality when brought to the facility. The District is also concerned that relocating these fish to perennial habitats may result in very poor net survival, and could even enhance disease outbreaks among healthy fish in the release area. A qualified District biologist will make such determinations on a case-by-case basis in the field.

1.3.1.4 Transport

The District uses dark colored 5-gallon buckets to transport rescued fish from the rescue sites to the transport vehicle. The buckets are outfitted with battery operated aerators. River water is used in the buckets whenever temperature and quality are adequate. When river water is too warm, the water in the truck transport tank is used. The number of fish allowed in the bucket will depend on size of fish captured (See RRMP; Table 6-2). At least one crew member monitors fish health within the transport buckets at all times, keeping a watchful eye out for unusual behavior such as rapid breathing or swimming near the top of the bucket. In addition, rescuers add small leafed branches from local alders and willows to float on the surface of each bucket to discourage fish from leaping out and provide calming cover during transport. Fish are never held in the buckets for more than an hour. Each bucket is transported to the truck as soon as loading densities have been reached.

The truck transport tank has a total volume of 250 gallons. The tank is segregated into two insulated 125-gallon compartments. Each compartment is aerated using a 10-amp vertical pump aerator. Each compartment has a compressed oxygen backup to supplement aeration or in case the aerators fail. When truck transport is unavailable, the District uses a transport trailer. The trailer is a single compartment 400-gallon tank. The tank is aerated using two 10-amp, 12-volt vertical pump aerators with compressed oxygen backup. Water for transport is typically obtained from the Carmel River at the facility or Garland Park. The tank water is conditioned with non-iodized salt (0.3% = 3 ppt salt concentration) and all steelhead are transported in this solution to reduce transport stress. Guidelines for loading densities in the transport tanks are based on steelhead size (See RRMP; Table 6-2). Juvenile steelhead are transported from the field to the Facility whenever possible, rather than being released to perennial habitat upriver. They are dip-netted out of the transport tank, graded into three to five size classes and put into the appropriate quarantine tanks. Adults and smolts are transported to either the lagoon or ocean.

1.3.2 Sleepy Hollow Steelhead Rearing Facility

The seven acre Facility was completed in 1996 and occupies a broad floodplain terrace bench at an elevation of 401 feet (Figure 1). A mature canopy of coast live oak (*Quercus agrifolia*), and several large California sycamores (*Platanus racemosa*) shade the site. Streamflow at the site is perennial, and augmented during the dry months by releases from Los Padres Reservoir (LPR). The Facility includes a storage/office building, an 800-foot-long rearing channel, two large cylindrical rearing tanks (Tank 1 and Tank 3), eight insulated fiberglass rearing troughs, and six 8-foot diameter quarantine tanks.

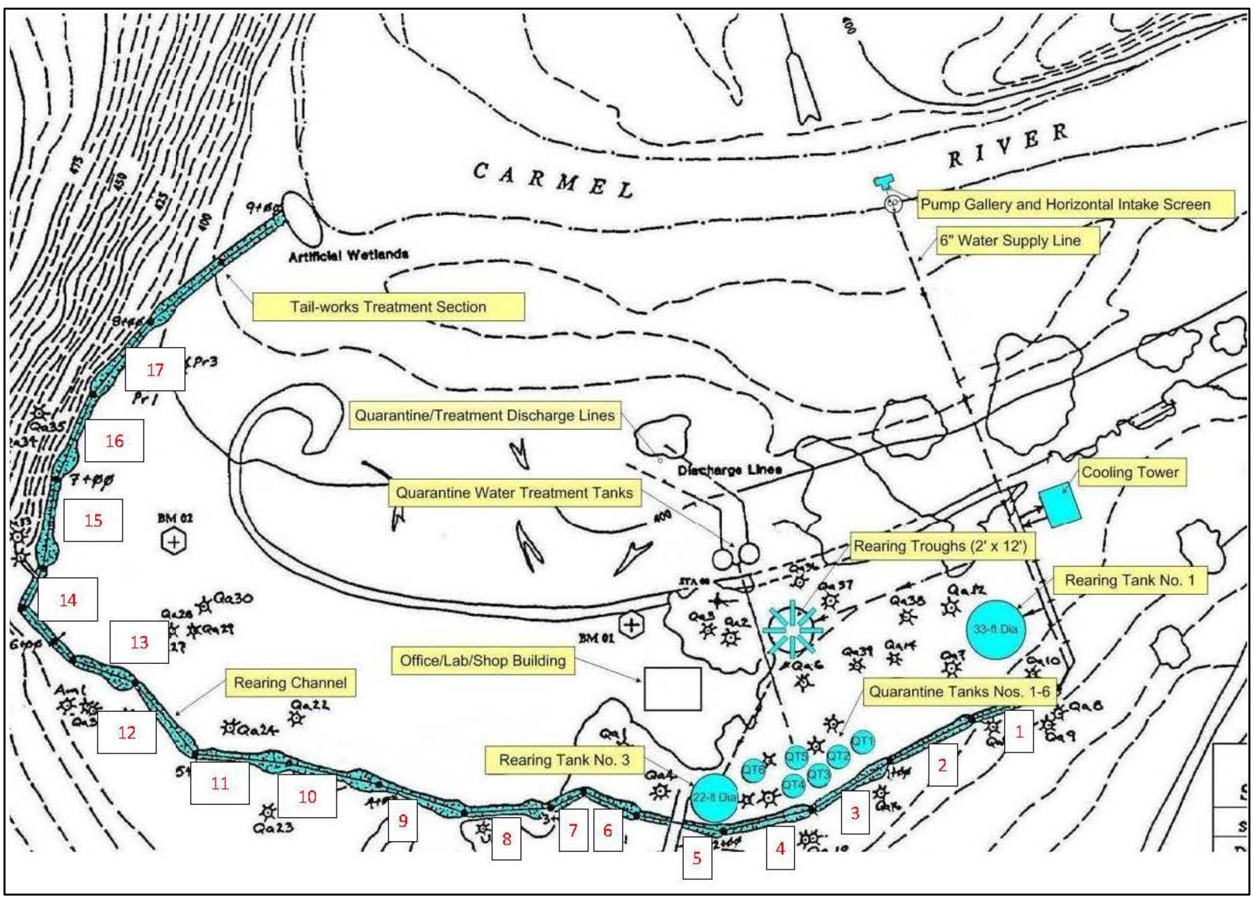

Figure 1: Topographic Map of Sleepy Hollow Steelhead Rearing Facility in Carmel, California. Rearing facilities are highlighted in turquoise. Rearing Tank 1 is no longer used for steelhead.

The rearing channel bays are specified by the adjacent numbers.

1.3.2.1 Rearing Areas

1.3.2.1.1 Quarantine Tanks

To help reduce the risk of passing infections from newly rescued steelhead to steelhead already stocked in the Facility, the District operates a quarantine system. The system consists of five, 8-foot diameter x 3.5-foot deep insulated 1,200 gallon tanks (Figure 1). Each tank has its own water and air supply line and recirculation chiller. The chillers are capable of maintaining temperatures as low as 50°F with typical inflow rates of 5-10 gallons per minute. Two additional tanks (8-foot diameter x 3.5 feet deep and 4-foot diameter x 2.5 feet deep) are located adjacent to the quarantine system and are used to hold fish for short periods of time or while fish are tallied. Each is fitted with water and air supply lines.

1.3.2.1.2 Rearing Tanks 1 and 3

The Facility includes two large above ground cylindrical rearing tanks (Rearing Tank 1 and Rearing Tank 3) (Figure 1). Rearing Tank 3 is 22-feet in diameter and Rearing Tank 1 is 30-feet in diameter. Valve-controlled water and air flows independently to these tanks and each tank is fitted with a central overflow standpipe to control water volume. Currently, these tanks cannot both be run effectively if the rearing channel, quarantine tanks, and rearing troughs are running at full flow, as the Facility inflow is insufficient for concurrent use of all the rearing containers. Rearing Tank 1 will not be used in the future for steelhead[1] but Rearing Tank 3 could be used in large rescue years depending on water availability.

1.3.2.1.3 Rearing Troughs

There are eight 200-gallon rearing troughs that are 2-foot x 2-foot x 10-foot (Figure 1). They are fitted with an overflow standpipe, independent inflow control valves, and a filtered air source. All the troughs have a chiller in place to help reduce water temperatures, and individual recirculating water filtration systems, which are only used when flow through needs to be minimized for disease treatment. The purpose of these smaller troughs is to provide a controlled environment for holding initial groups of fry and small fingerlings, who are difficult to feed, tend to have more disease outbreaks, and do not adapt well to being immediately stocked into the rearing channel. Once they are stable and have reached a size sufficient to survive well in the rearing channel, they are relocated there.

1.3.2.1.4 Rearing Channel

Most steelhead are reared in an 800-foot long rearing channel (Figure 1). The channel winds along the base of a steep, north- facing hill, under a dense canopy of mature coast live oaks, maples, and sycamores. Water for the rearing channel is routed through the cooling tower from the river (see below). The rearing channel is split into seventeen (17) bays. Each bay has a pool interspersed between a riffle and run with the bottom covered in a layer of cobbles, boulders and large gravel. Nominal depth of the channel is 3 feet; actual depth varies from 2.5 feet in pools to about ¼ foot in the shallowest riffles. The channel is fitted with a horizontal, rotating drum screen at the downstream end to prevent fish from uncontrollably migrating out of the Facility, which is checked daily. Filtered air from the blowers flows into a 6-inch PVC pipe that runs

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[1] Rearing Tank 1 has been holding red-legged frogs in some years at the request of USFWS.

along the top edge of the channel branching off at each pool, where a 2-inch pipe supplies clean air to a series of water filters. Below the 800-foot main section of the channel, there is a 100-foot long tail-works section consisting of six bays filled with red lava rock (¾-inch size). The tail-works function as a final biological filter for all the water leaving the Facility, prior to discharge back into the river, approximately 300 feet downstream of the intake diversion.

1.3.2.2 Water

In 2018, the District upgraded the Facilities' water supply system. The District improved the Facility's water supply intake and cooling tower as well as installed a water recirculation (reuse) system. Improvements to the water supply intake were needed to address existing maintenance issues, operational constraints, increases in sandy bed load and to provide greater instream intake screen reliability. The addition of an intake water reuse system will allow for the facility to operate when river flows fall below 2 cfs and/or when the sediment load spikes during winter storms (≥ 25 milligrams/liter).

The new river water intake pump station consists of two submersible non-clog pumps installed in a concrete wet well, with each pump sized to provide the total desired flow of 1,350 gpm. Two pumps are installed to provide redundancy in the event that the primary pump goes out of service. Pipes and valves are installed to allow operators to direct the river water to the reuse pump station when desired due to high sediment load or other river conditions. This allows the option of receiving flow that would settle and be filtered before being re-pumped to the cooling tower. The river water pumps (either operating alone or in unison with the reuse pump station) typically need to deliver between 810 gpm and 1,350 gpm depending on level of reuse. Alarms are activated in the event of pump motor temperature exceedance, motor seal leakage, low wet well water level, or if the pump is running with zero flow at the flow meter.

Associated with the water upgrade, treatment of water includes the following; solids filtration, cooling, dissolved gas conditioning, and pathogen disinfection. Sediment settling uses the existing LAKOS sand separator with the addition of a sediment settling basin. The facility has the ability to disinfect water with UV irradiation. A UV dose of 30,000 micro-watt seconds per square centimeter will be used to reduce most common fish pathogens. To control solids so that UV transmissivity is increased, water is filtered in a microscreen filter with 30-micron screen media. The system is designed to capture 40 percent of the solids and controlling total suspended solids (TSS) to less than 10 mg/L during moderate river stages. The existing cooling tower will continue to be used to increase dissolved oxygen levels and reduce dissolved carbon dioxide levels, as well as for cooling. To improve system efficiency, the cooling tower was raised by approximately 8 feet and a new elevated headbox was constructed to receive cooling tower flows before discharging to the rearing channel.

The District monitors river water quality at the Sleepy Hollow Weir twice per month. They monitor dissolved oxygen, carbon dioxide, conductivity, turbidity, and pH. River water temperature is recorded continuously. The District monitors daily dissolved oxygen and temperatures within the rearing channel at three points (head, middle, end). Water from the quarantine system, not used in the treatment of fish (i.e., contains no chemicals), is discharged onto the cobble bar where it percolates into the shallow groundwater adjacent to the Facility. The District discharges treatment water containing formalin or antibiotics into a pair of 8-foot diameter holding tanks and treats the formaldehyde-laden water with ozone for three or more days to oxidize the residual formaldehyde into formic acid, carbon dioxide and water. Once treated, the District discharges the water onto the cobble bar (100-feet from the river). The data are provided the Central Coast Regional Water Quality Control Board (CC-RWQCB) on an annual basis. Based on annual reports, the CC-RWQCB issued a General Waiver for Specific Types of Discharges in 2008 and 2014 (RRMP: Appendix 4-E).

1.3.3 Rearing Protocols

During the quarantine phase of rearing, steelhead are typically brought to the Facility daily. Upon arrival, the steelhead are transferred from the transport truck or tanks into a quarantine tank. They are separated by size and recounted to verify numbers. Any steelhead that appear unhealthy or diseased are culled. The remaining steelhead are held overnight without food, and treated the next day with an initial dilute formalin bath of 15-25 ppm for 6-8 hours, followed if necessary the second day by an oxytetracycline bath of similar duration.

The general rearing season begins after steelhead leave the quarantine tanks. The steelhead are separated into the following five groups:

1. Fry-fingerling (<50mm) are allocated to the rearing troughs.
2. Fingerling (50-100mm) are allocated to specific rearing channel bays filling it from an upstream to downstream direction.
3. Larger Fingerlings (100-120mm) are allocated to rearing channel bays downstream of bay 4 (Figure 1).
4. 120-150mm steelhead are allocated to the rearing channel upstream of bay 4, filling it from the uppermost end first (Figure 1).
5. >150 mm are allocated most often to the top sections of the rearing channel, where steelhead less than 150 mm have never been stocked. Occasionally they are placed in Rearing Tank 3, when water capacity can support it and it is a large rescue year.

The rearing areas are checked once to twice per day for mortality. Dead fish are counted and collected. A subsample of incoming rescued steelhead are measured for weight, length and PIT tagged.

1.3.3.1 Feeding

Steelhead are fed a combination of natural and artificial food. At the outset of stocking, steelhead are fed a mixture of semi-moist pellets and frozen krill or brine shrimp to hasten their acceptance of artificial food. Many readily accept pelletized food, while others resist and continue to eat natural food. “Bug zappers” have been installed above the rearing channel and rearing tanks to deliver additional insects for food to the steelhead. Once steelhead have adjusted to pelletized food, they are fed at the target rate of approximately 2-4 percent body weight/day, according to guidelines for general size and temperature (Leitritz and Lewis 1976). For steelhead in the rearing channel, these rates are adjusted slightly downward to account for natural food that falls into the channel. For YOY, the daily ration is adjusted to account for expected growth and known mortality with a goal of rearing fish to approximately 120 mm by the end of the rearing season. In some cases, larger fish are placed on a maintenance ration to maintain their body size and help inhibit early maturation.. In the rearing channel, belt feeders are rotated to different locations, to prevent dominant steelhead from defending territory under the feeder. In addition, fish are fed twice daily by hand application. Steelhead are fed by hand in rearing tank 3, rearing troughs, and potentially the quarantine tanks.

1.3.3.2 Disease

The District monitors behavior of the steelhead on a daily basis and notes whether individual fish exhibit obvious signs of disease or unusual behaviors such as flashing, jumping, lethargic swimming, lack of swimming, or rapid breathing. Daily tallies are kept of known mortality. When this tally rises unexpectedly, for example doubles from the average for that year, or a number of fish exhibit abnormal behaviors, the District may request a health inspection by fish pathologists from the CDFW (California Department of Fish and Wildlife) and will implement their recommended control measures.

The ability to chemically treat fish in the facility is limited to the capacities of the Quarantine Tanks and Rearing Troughs. The outflow from these components is connected to two water treatment tanks, which allow ozonation of treatment water to remove the treatment chemicals as described above. At times, the District treats small groups of diseased fish with formalin and oxytetracycline at concentrations and durations recommended by the CDFW. Due to discharge restrictions and the facility’s limited ability to remove chemical treatments from discharge water, the vast majority of the fish in the Facility cannot be treated with effective chemicals. The only feasible prophylactic compound that can be used and discharged is sodium chloride, and it is applied as needed against *Ichthyophthirius multifiliis* “Ich” outbreaks, and also has beneficial effects on bacterial pathogens. This requires adding pulses of salt brine to the inflow in the rearing channel and other components. The salt treatment does not measurably affect water quality downstream of the facility.

1.3.3.3 Rearing Densities

The following rearing stocking densities will be implemented at the Facility (Table 2). Stocking densities are based on the type of tank, volume of the tank or rearing channel bay, water quantity and quality, and average weight of steelhead at the end of the season. The maximum capacity of the Facility is 51,585 steelhead.

Table 2: Stocking densities at the Facility by Rearing Channel Bay (RC Bay), Rearing Tank 3, Quarantine Tanks and Rearing Troughs.

Tank type	Volume (m^3)	Stocking Density (kg/m^3)	Stocking Biomass (kg)	End of Season weight (g)	Raw Stocking Calculation	Stocking Estimate (# fish)
RC Bay 1	15.72	5	78.58	0.039	2014.85	2014
RC Bay 2	17.56	5	87.78	0.039	2250.82	2250
RC Bay 3	20.67	5	103.36	0.039	2650.16	2650
RC Bay 4	15.01	5	75.04	0.039	1924.09	1924
RC Bay 5	19.26	5	96.28	0.039	2468.64	2468
RC Bay 6-7	35.68	5	178.40	0.039	4574.25	4574
RC Bay 8	18.97	5	94.86	0.039	2432.34	2432
RC Bay 9	17.84	5	89.20	0.039	2287.13	2287
RC Bay 10	17.98	5	89.91	0.039	2305.28	2305
RC Bay 11	21.24	5	106.19	0.039	2722.77	2722
RC Bay 12	17.70	5	88.49	0.039	2268.97	2268
RC Bay 13	20.25	5	101.23	0.039	2595.71	2595
RC Bay 14	20.10	5	100.52	0.039	2577.55	2577
RC Bay 15	18.41	5	92.03	0.039	2359.73	2359
RC Bay 16	18.26	5	91.32	0.039	2341.58	2341
RC Bay 17	20.53	5	102.65	0.039	2632.01	2632
RC Total	315.17	5	1575.83	0.039	40405.90	40405
Rearing Tank 3	40.00	5	200.00	0.039	5128.21	5128
8 Rearing Troughs	6.72	5	33.60	0.01	3360.00	3360
5 Quarantine Tanks	21.00	5	105.00	0.039	2692.31	2692
Total Facility Capacity						**51585**

1.3.4 Release Protocols

1.3.4.1 Translocated Steelhead

Translocated steelhead are fish that are released into perennial reaches, lagoon/estuary, or the ocean the same day they are rescued. They are never brought to the rearing facility. They are translocated instead of reared at the facility because either the capacity of the rearing facility has already been met, there is a desire by NMFS and the District to seed the lagoon, or because of their lifestage (i.e., smolt and adults). If additional steelhead were to be translocated to perennial habitat for another reason, NMFS must give prior approval.

A portion of the fry (size <50 mm) may be translocated to the lagoon to provide the initial seeding of the habitat. Pre-smolts rescued during the spring of dry and critically dry years may be transported to the lagoon. Smolts and kelts rescued during the spring of dry and critically dry years will be transported and released into the Pacific Ocean at Stewart's Cove. A decision on exact translocation sites will be made following discussions with the NMFS on a month-to-month basis, and will depend on lagoon water quality, presence of striped bass, expectation of future flows, and whether the rescued fish have well-developed smolt characteristics.

All steelhead will be transported, acclimated (where applicable) and released using the equipment previously discussed in Section 1.3.1.4 (Transport). Temperature differences between the transport container and translocation sites will be within 5° F. If the difference in temperature is greater than 5° F, temperature in the transport tank will be adjusted by adding block ice in sealed bags to prevent introduction of any significant amount of chlorine, or mixing receiving water with tank water prior to releasing steelhead.

Smolts and kelts that are collected in the box trap will be loaded into the transport vehicle, and held for 25 minutes prior to transport to the lagoon or ocean. Transport densities will be limited with the intention of avoiding overcrowding and extra stress, as described in RRMP section 8. During this period, a visual check shall be made, and the opercular breath rates (gill cover movement) of several steelhead shall be noted and recorded. After breath rates are measured, smolts and kelts will be transitioned to full-strength seawater over a period of 3-5 hours. Following transport and arrival at the lagoon or ocean, the breath rates shall again be noted and recorded. If rates have increased and steelhead appear agitated, the entire group will be released into the lagoon. If rates have declined or the steelhead appear quiescent, the entire group will be released into Stewart's Cove after they are transitioned to full strength seawater.

1.3.4.2 Release of Facility Reared Steelhead

Steelhead brought to the Facility will be released to the general area in the river from which they were rescued in the fall or winter. They will be returned after the river has been rewetted for 2-4 weeks. Historically the release time period has varied from October to February, depending on when the river is rewetted in the areas where rescues occurred.

The capture of steelhead in the rearing channel for release will use the following methodology summarized from RRMP section 8. The water level is lowered in the bay where steelhead are to be captured for release. The steelhead are captured first by seine, dip nets and buckets. This will be continued until fewer than five steelhead are captured per attempt. At that point, steelhead will be herded with an electrofisher into netted off sections within each pool, where they will be dip-netted and transferred to either the transport truck or holding tank. Capturing the steelhead in the entire rearing channel takes 10-15 days to complete. Steelhead in rearing tank 3 and the rearing troughs will be captured with a seine and dip nets. A subsample of steelhead will be PIT tagged prior to release.

Prior to release of any steelhead, the CDFW Fish Pathology Lab in Rancho Cordova is notified, and a small subsample of steelhead may be sacrificed and sent for pathogen, disease and parasite testing. In addition, a local vet specializing in fish, will conduct an annual pre-health inspection.

During emergency releases (i.e., fires/floods) the District will discuss release options with NMFS. If the District determines that an emergency release is warranted, they will not release any steelhead within the quarantine tanks that have not undergone a full round of treatment and/or any steelhead that upon visual inspection appear to show signs of disease. In addition, the District will make every effort (within reason considering the type of emergency) to have a pre-release inspection conducted from the local veterinarian, as would occur under normal release conditions.

The following methods are a guide to emergency releases, actual methods may vary slightly based on the type of emergency and discussions with NMFS, as described in RRMP section 8. Dip-nets and buckets will be used to transfer as many steelhead as possible out of the rearing channel into the river, or into other available rearing space. If space is available, steelhead >120 mm will be transferred to the rearing tanks and steelhead <120 mm will be placed in the river. If no space is available, all steelhead will be released into the river adjacent to the Facility. Following the above mentioned dip-netting, the remaining steelhead will be herded with an electrofisher into netted-off sections in each rearing channel bay where then they will then be dip-netted and transferred depending on the available space and size, as outlined above. The District anticipates that the methods outlined above can take up to nine days to complete. If the emergency requires faster action[2], as many steelhead as possible, depending on human safety, will be immediately walked to the river in 5 gallon buckets after they are captured from their rearing area.

2 ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

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

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and/or an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of" a listed species, which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features" (81 FR 7214).

The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The new critical habitat regulations (81 FR 7414) replace this term with physical or biological features (PBFs). The shift in terminology does not change the

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[2] For example, if flood or fire will soon prevent safe operation (for people or steelhead) of the Facility's rearing areas, all steelhead remaining at the Facility will be immediately walked to the river in five-gallon buckets if possible.

approach used in conducting a ‘‘destruction or adverse modification’’ analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

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

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

To conduct the assessment, NMFS examined an extensive amount of information from a variety of sources. Detailed background information on the biology and status of the species and critical habitat has been published in a number of documents including peer reviewed scientific journals, primary reference materials, and governmental and non-governmental reports. For information that has been taken directly from published, citable documents, those citations have been referenced in the text and listed at the end of this document.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species’ likelihood of both survival and recovery. The species status section also helps to inform the description of the species’ current “reproduction, numbers, or distribution” as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential PBFs that help to form that conservation value.

2.2.1 Species Description, Life History, and Status

This programmatic biological opinion analyzes the effects of the federal action on the following Federally-listed species Distinct Population Segment (DPS) and designated critical habitat:

S-CCC steelhead DPS
Threatened (January 5, 2006; 71 FR 834)
Critical habitat (September 2, 2005; 70 FR 52488).

The S-CCC steelhead DPS includes all naturally spawned steelhead populations in streams from the Pajaro River watershed (inclusive) to, but not including, the Santa Maria River, (71 FR 834) in northern Santa Barbara County, California. There are no artificially propagated steelhead stocks within the range of the S-CCC steelhead DPS.

2.2.1.1 S-CCC Steelhead General Life History

Steelhead are anadromous fish, spending time in both fresh and saltwater. Steelhead possess a complex life history requiring successful completion and transition through various life stages in marine and freshwater environments (e.g., spawning and outmigration, egg-to-fry emergence, juvenile rearing, smolt outmigration and ocean survival). Eggs (laid in gravel nests called redds), alevins (gravel dwelling hatchlings), fry (juveniles newly emerged from stream gravels), and young juveniles all rear in freshwater until they become large enough to migrate to the ocean to finish rearing and maturing to adults. Eggs incubate and emerge in about three weeks (depending on water temperature), and the alevins remain in small spaces between gravels before entering the stream water column. Steelhead fry rear in edgewater habitats and move gradually into pools and riffles as they grow larger. Cover is an important habitat component for juvenile steelhead, both as a velocity refuge and as a means of avoiding predation (Shirvell 1990; Meehan and Bjorn 1991). Steelhead, however, tend to use riffles and other habitats not typically associated with instream cover during summer rearing more than other salmonids. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. Rearing steelhead juveniles prefer water temperatures of 7-14˚ C (Barnhart 1986; Bjornn 1991). They can survive in water up to 27˚ C with saturated dissolved oxygen conditions and a plentiful food supply. Fluctuating diurnal water temperatures also aid in survivability of salmonids (Busby et al. 1996).

Although variation occurs in coastal California, juveniles usually spend one to two years in freshwater, then smolt and migrate to the ocean, using an estuary for acclimation to saltwater and as a migration corridor. They usually spend one to three years in the ocean (usually two years in the Pacific southwest) (Barnhart 1986), where they mature into adults before returning to their natal stream to spawn. Steelhead may spawn one to four times over their life. The maximum lifespan of a steelhead is approximately nine years (Moyle 2002).

Studies of coastal *O. mykiss* populations in central and southern California reveal three principal life-history groups, which NMFS describes as fluvial-anadromous, lagoon-anadromous, and freshwater resident[3] (Smith 1990; Bond 2006; Boughton et al. 2007). Both anadromous groups classify as winter steelhead, in that adults migrate during the winter rainy season. Lagoon-anadromous fish spend either their first or second summer as juveniles in a seasonal lagoon at the mouth of a stream (Boughton et al. 2006).

[3] Freshwater residents, or rainbow trout, are not listed under the ESA.

2.2.1.2 Status of S-CCC Steelhead DPS

In this opinion, NMFS uses the Viable Salmon Population (VSP) concept by using four population viability parameters to help us understand the status of S-CCC steelhead DPS and the population's ability to survive and recover. These population viability parameters are: abundance, population growth rate, spatial structure, and diversity (McElhany et al. 2000). While there is insufficient information to evaluate these population viability parameters in a thorough quantitative sense, NMFS has used existing information to determine the general condition of the S-CCC steelhead DPS and factors responsible for the current status of S-CCC steelhead DPS.

We use these population viability parameters as surrogates for numbers, reproduction, and distribution, the criteria found within the regulatory definition of jeopardy (50 CFR 402.20). For example, the first three parameters are used as surrogates for numbers, reproduction, and distribution. We relate the fourth parameter, diversity, to all three regulatory criteria. Numbers, reproduction, and distribution are all affected when genetic or life history variability is lost or constrained, resulting in reduced population resilience to environmental variation at local or landscape-level scales.

Populations of S-CCC steelhead throughout the DPS have exhibited a long-term negative trend since the mid-1960s. In the mid-1960s, total spawning populations were estimated at 17,750 individuals (Good et al. 2005). Available information shows S-CCC steelhead population abundance continued to decline from the 1970s to the 1990s (Busby et al. 1996) and data indicate this trend continues (Good et al. 2005). Current S-CCC steelhead run-sizes in the five largest systems in the DPS (Pajaro River, Salinas River, Carmel River, Little Sur River, and Big Sur River) are likely greatly reduced from 4,750 adults in 1965 (CDFG 1965) to less than 500 returning adult fish in 1996. More recent estimates for total run-size do not exist for the S-CCC steelhead DPS (Good et al. 2005).

Analyses conducted by NMFS (Boughton et al. 2006; Boughton et al. 2007; Williams et al. 2011; Williams et al. 2016) indicate the S-CCC steelhead DPS consists of 12 discrete sub-populations which represent localized groups of interbreeding individuals, and none of these sub-populations currently meet the definition of viable under the VSP concept. Most of these sub-populations can be characterized by low population abundance, variable or negative population growth rates, and reduced spatial structure and diversity. The sub-populations in the Pajaro River and Salinas River watersheds are in particularly poor condition (relative to watershed size) and exhibit a greater lack of viability than many of the coastal subpopulations.

Although steelhead are present in most streams in the S-CCC DPS (Good et al. 2005), their populations are small, fragmented, and unstable, or more vulnerable to stochastic events (Boughton et al. 2006). The top threats to the S-CCC as identified in the recovery plan (NMFS 2013) are; dams and surface water diversions, groundwater extractions, passage barriers, wildfires and urbanization. Severe habitat degradation and the compromised genetic integrity of some populations pose a serious risk to the survival and recovery of the S-CCC steelhead DPS (Good et al. 2005). NMFS' 2005 status review concluded S-CCC steelhead remain "likely to become endangered in the foreseeable future" (Good et al. 2005). NMFS confirmed the listing of S-CCC steelhead as threatened under the ESA on January 5, 2006 (71 FR 834). Observations suggest the number of adult returns is fluctuating, sometimes below recent low numbers. The

Coastal Monitoring Plan (CMP) was developed to standardize the sampling of salmonids in a way that would inform the VSP criteria (Adams et al. 2011). Since the development of the CMP there has been one effort to conduct population/redd surveys in the S-CCC DPS with mixed results (Williams et al. 2016). MPWMD has conducted redd surveys, as resources permited, in the lower Carmel River (Williams et al. 2016). MPWMD has not fully implemented the protocols used in the northern part of the state, which specify that sampled reaches be resurveyed every two weeks for the duration of the spawning season due to weather and flows (Gallagher and Gallagher 2005; Williams et al. 2016). This has likely resulted in an undercount of redds (Williams et al. 2016, K. Urquhart, MPWMD, personal communication, July 2016).

Further detailed information on this steelhead DPS is available in NMFS' Status Review of West Coast Steelhead from Washington, Idaho, Oregon, and California (Busby et al. 1996), NMFS' final rule for listing steelhead (62 FR 43937), and NMFS' recovery plan (NMFS 2013). Additional information is available from the NMFS Southwest Fisheries Science Center (SWFSC). The SWFSC has prepared several reports specifically for recovery planning that provide: 1) characterization of the S-CCC steelhead DPS historical population structure; 2) viability criteria for recovery; 3) assessment of threats; and 4) recommendations for recovery of the highest priority populations (Boughton and Goslin 2006; Boughton et al. 2006; Boughton et al. 2007). The two most recent status updates conclude that steelhead in the S-CCC steelhead DPS remain "likely to become endangered in the foreseeable future" (Williams et al. 2011; Williams et al. 2016), as new and additional information available since Good et al. (2005) does not appear to suggest a change in extinction risk. On December 7, 2011, and again on May 26, 2016, NMFS chose to maintain the threatened status of the S-CCC steelhead DPS (76 FR 76386; 81 FR 33468).

2.2.1.3 Status of S-CCC Steelhead Critical Habitat

In designating critical habitat, NMFS considers the following requirements of the species: 1) space for individual and population growth, and for normal behavior; 2) food, water, air, light, minerals, or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for spawning, reproduction, and rearing offspring; and, generally; and 5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species (50 CFR 424.12(b)). In addition to these factors, NMFS also focuses on known PBFs within the designated area that are essential to the conservation of the species and that may require special management considerations or protection. For S-CCC steelhead, PBFs include (70 FR 52488):

1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development. These features are essential to conservation because without them the species cannot successfully spawn and produce offspring.

2) Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks. These features are essential to conservation because without them, juveniles cannot access and use the areas needed to forage, grow, and

develop behaviors (e.g., predator avoidance, competition) that help ensure their survival.

3) Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival. These features are essential to conservation because without them juveniles cannot use the variety of habitats that allow them to avoid high flows, avoid predators, successfully compete, begin the behavioral and physiological changes needed for life in the ocean, and reach the ocean in a timely manner. Similarly, these features are essential for adults because they allow fish in a non-feeding condition to successfully swim upstream, avoid predators, and reach spawning areas on limited energy stores.

4) Estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation. These features are essential to conservation because without them juveniles cannot reach the ocean in a timely manner and use the variety of habitats that allow them to avoid predators, compete successfully, and complete the behavioral and physiological changes needed for life in the ocean. Similarly, these features are essential to the conservation of adults because they provide a final source of abundant forage that will provide the energy stores needed to make the physiological transition to fresh water, migrate upstream, avoid predators, and develop to maturity upon reaching spawning areas.

For the S-CCC steelhead DPS, approximately 1,251 miles of stream habitat, and 442 square miles of estuarine habitat are designated critical habitat (70 FR 52488). Critical habitat for the DPS has been designated in the following CALWATER Hydrologic Units: Pajaro River, Carmel River, Santa Lucia, Salinas, and Estero Bay. Tributaries in the Neponset, Soledad, and Upper Salinas Valley Hydrologic Sub-areas (HSA) were excluded from critical habitat and Department of Defense lands in the Paso Robles and Chorro HSAs were excluded.

The coastal drainages used by the S-CCC steelhead DPS provide relatively higher amounts of the freshwater rearing PBF, maintain connectivity, and result in a wider distribution of the species in these drainages than in inland drainages. Inland drainages provide important freshwater migration, freshwater spawning, and freshwater rearing PBFs unique within the inland ecotype. However, most areas of critical habitat in both coastal and inland drainages have been degraded compared to conditions that once supported thriving populations of steelhead.

2.2.2 Factors Responsible for the Decline of S-CCC Steelhead DPS and Degradation of S-CCC Critical Habitat

Of the watersheds in the S-CCC steelhead DPS historically supporting steelhead, most continue to support runs, although run sizes are significantly reduced, or no longer exist in many sub-watersheds. A reduced population size causes each individual within the population to be more important and significantly increases the population’s susceptibility to small or catastrophic events. Moreover, low population sizes compromise genetic integrity, posing serious risks to steelhead survival and recovery. The four largest watersheds (Pajaro, Salinas, Nacimiento/ Arroyo Seco, and Carmel rivers) have experienced declines in run sizes of 90 percent or more, and steelhead are extirpated from many of their subwatersheds primarily due to anthropogenic and environmental influences. Steelhead in this DPS have declined in large part as a result of anthropogenic influences associated with agriculture, mining, and urbanization activities that have resulted in the loss, degradation, simplification, and fragmentation of habitat (and to some degree disease) (NMFS 2013).

2.2.2.1 Habitat Alteration

Habitat destruction and fragmentation have been linked to increased rates of species extinction over recent decades (Davies et al. 2001). A major cause of the decline of steelhead is the loss or decrease in quality and function of PBFs. Most of this loss and degradation of habitat, including critical habitat, has resulted from anthropogenic watershed disturbances caused by water diversions, the influences of large dams, agricultural practices (including irrigation), ranching, recreation, urbanization, loss of estuarine habitat and wetland and riparian areas, roads, grazing, gravel mining, and logging. Associated impacts of these factors include: alteration of stream bank and channel morphology; alteration of ambient stream water temperatures; degradation of water quality; elimination of spawning and rearing habitats; fragmentation of available habitats; elimination of downstream recruitment of spawning gravels and large woody debris (LWD); removal of riparian vegetation resulting in increased stream bank erosion; and increased sedimentation input into spawning and rearing areas resulting in the loss of channel complexity, pool habitat, suitable gravel substrate, and LWD.

As stated above, a significant percentage of estuarine habitats have been lost, particularly in the northern and southern portions of the S-CCC steelhead DPS where the majority of the wetland habitat historically occurred. The condition of these remaining wetland habitats is largely degraded, with many wetland areas at continued risk of loss or further degradation. Where historically harmful practices have stopped, the damage from these activities still needs to be addressed and the necessary restoration activities will likely require decades.

2.2.2.2 Water Use

Water storage, withdrawal, conveyance, and diversions for agriculture, flood control, domestic, and hydropower purposes have greatly reduced or eliminated historically accessible habitat. Modification of natural flow regimes by dams and other water control structures have resulted in increased water temperatures, changes in fish community structures, depleted flow necessary for migration, spawning, rearing, flushing of sediments from spawning gravels, and reduced gravel recruitment. The substantial increase of impermeable surfaces as a result of urbanization (including roads) has also altered the natural flow regimes of rivers and streams, particularly in lower reaches. Depletion and storage of natural flows have altered natural hydrological cycles in many California rivers and streams in general, including streams providing habitat to the S-CCC steelhead DPS in particular.

2.2.2.3 Fishing Harvest

Steelhead populations traditionally supported an important recreational fishery throughout their range and likely increased the mortality of adults and juveniles. There are few good historical accounts of the abundance of steelhead harvested along the California coast (Jensen and Swartzell 1967). However, Shapovalov and Taft (1954) report that very few steelhead were caught by commercial salmon trollers at sea but considerable numbers were taken by sports anglers in Monterey Bay. Although such impacts may have contributed to the decline of some naturally small populations, NMFS does not consider it to be a principal cause for the decline of the S-CCC steelhead DPS (NMFS 2011). Some recreational angling for *O. mykiss* continues to be allowed in all coastal drainages in its range and also continues to occur in areas above currently impassible barriers. CDFW also restricts angling on streams accessible to anadromous fish through their angling regulations, which includes daily restrictions and limited catch numbers along with catch-and-release fishing. This may relieve some of the negative pressures associated with angling on the population, however, it should be noted that even catch-and-release fishing can have adverse effects on listed fish. During periods of decreased habitat availability (e.g., drought conditions or summer low flow when fish are concentrated in freshwater habitats); the impacts of recreational fishing or harassment on native anadromous stocks can increase (NMFS 2011).

2.2.2.4 Artificial Propagation

There are no steelhead hatcheries operating in or supplying hatchery reared steelhead to the DPS. However, there is an extensive stocking program of hatchery cultured and reared, non-anadromous *O. mykiss* which supports a put-and-take fishery that is stocked for removal by anglers. These stockings are now generally conducted in non-anadromous waters (though other non-native game species such as smallmouth bass (*Micropterus dolomieui*) and bullhead catfish (*Ameiurus* sp.) are stocked into anadromous waters by a variety of public and private entities). Nevertheless, hatchery origin non-anadromous fish may enter anadromous waters as a result of spillage over dams. Although these stockings are generally carried out in waters which do not support anadromous populations, the potential does exist for fish to escape into anadromous waters.

2.2.2.5 Environmental Factors and Ocean Conditions

Variability in natural environmental conditions has both masked and exacerbated the problems associated with degraded and altered riverine and estuarine habitats. Floods and persistent drought conditions have periodically reduced naturally limited spawning, rearing, and migration habitats. Furthermore, El Nino events and periods of unfavorable ocean-climate conditions can threaten the survival of steelhead populations already reduced to low abundance levels due to the loss and degradation of freshwater and estuarine habitats. Variability in ocean productivity has been shown to affect salmon production both positively and negatively. Beamish and Bouillion (1993) showed a strong correlation between North Pacific salmon production and marine environmental factors from 1925 to 1989. Periods of favorable ocean productivity and high marine survival can temporarily offset poor habitat conditions elsewhere and result in dramatic increases in population abundance and productivity by increasing the size and correlated fecundity of returning adults (NMFS 2013). As noted below, the threats from projected climate change are likely to exacerbate the effects of environmental variability on steelhead and its habitat in the future. Thus, increased environmental variability resulting from projected climate change is now recognized as a new and more serious factor that may threaten the recovery of the S-CCC steelhead DPS (NMFS 2013).

2.2.2.6 Disease

Infectious disease is one of many factors that can influence adult and juvenile steelhead survival. Specific diseases such as bacterial kidney disease, Ceratomyxosis, Columnaris, Furunculosis, infectious hematopoietic necrosis, redmouth and black spot disease, Erythrocytic Inclusion Body Syndrome, and whirling disease among others are present and are known to affect steelhead and salmon. Very little current or historical information exists to quantify changes in infection levels and mortality rates attributable to these diseases for steelhead. Warm water temperatures, in some cases can contribute to the spread of infectious diseases. However, studies have shown that native fish tend to be less susceptible to pathogens than hatchery cultured and reared fish (Buchanan et al. 1983).

The effects of disease may be heightened under conditions of periodic low flows or high temperatures which are characteristic of watersheds in this DPS.

2.2.2.7 Global Climate Change

Another factor affecting the rangewide status of S-CCC steelhead and their critical habitat at large is climate change. Impacts from global climate change are already occurring in California. For example, average annual air temperatures, heat extremes, and sea level have all increased in California over the last century (Kadir et al. 2013). Snow melt from the Sierra Nevada has declined (Kadir et al. 2013). However, total annual precipitation amounts have shown no discernible change (Kadir et al. 2013). S-CCC steelhead may have already experienced some detrimental impacts from climate change. NMFS believes the impacts on listed salmonids to date are likely fairly minor because natural, and local, climate factors likely still drive most of the climatic conditions steelhead experience, and many of these factors have much less influence on steelhead abundance and distribution than human disturbance across the landscape. In addition, S-CCC steelhead are not dependent on snowmelt driven streams and thus not directly affected by declining snow packs.

The threat to S-CCC steelhead from global climate change will increase in the future. Modeling of climate change impacts in California suggests that average summer air temperatures are expected to continue to increase (Lindley et al. 2007; Moser et al. 2012). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe et al. 2004; Moser et al. 2012; Kadir et al. 2013). Total precipitation in California may decline; critically dry years may increase (Lindley et al. 2007; Schneider 2007; Moser et al. 2012). Wildfires are expected to increase in frequency and magnitude (Westerling et al. 2011; Moser et al. 2012). Many of these changes are likely to further degrade S-CCC habitat by, for example, reducing streamflows during the summer and raising summer water temperatures. Estuaries may also experience changes detrimental to salmonids. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia et al. 2002; Ruggiero et al. 2010). In marine environments, ecosystems and habitats important to juvenile and adult salmonids are likely to experience changes in temperatures, circulation, water chemistry, and food supplies (Feely 2004; Brewer and Barry 2008; Osgood 2008; Turley 2008; Abdul-Aziz et al. 2011; Doney et al. 2012).

The projections described above are for the mid to late 21st Century. In shorter time frames, climate conditions not caused by the human addition of carbon dioxide to the atmosphere are more likely to predominate (Cox and Stephenson 2007; Santer et al. 2011).

2.3 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for this Program is the entire Carmel River watershed below LPD including the mainstem and its tributaries to the mouth of the Carmel River (approximately 25 river miles), at its confluence to the Pacific Ocean, as well as Stewart's Cove.

2.4 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The Carmel River is a central California coastal river that drains approximately 255 square miles of watershed to the Pacific Ocean. Past and present land use within the watershed are open space, grazing lands, viticulture, golf courses, and residential, suburban, urban, and light industrial developments (Carmel River Watershed Conservancy 2004). There are significant human impacts in the Carmel River basin, including, illegal water withdrawals, the over appropriation of surface and groundwater, urbanization, an expansive road network, operation of LPD, mechanical sandbar breaching, and grazing and agriculture practices that cumulatively result in a degradation of habitat quality (Smith et al. 2004). However the recent removal of SCD and associated rerouting and restoration has improved instream and riparian habitat.

2.4.1 Status of Listed Species in the Carmel River

The Carmel River population of S-CCC steelhead is considered a very important population within the DPS, as it likely provides dispersal to the smaller coastal populations. For a description of the DPS and its status see Section 2.2.1.2. While the coastal populations are in better condition than the populations in the larger interior rivers (e.g., Salinas River), the smaller coastal Big Sur Biogeographic Population Group populations are not currently considered viable and may not be able to persist without straying from the Carmel River population (NMFS 2013). Therefore, the Carmel River steelhead run was identified as a Core 1 (i.e., highest priority) population within NMFS' S-CCC DPS recovery plan and is targeted by NMFS for increased conservation and recovery efforts (NMFS 2013).

Adult migration in the Carmel River typically occurs January through May, with the majority of spawning between February and March (MPWMD 2019). Smolts typically migrate downstream in the spring with peaks in April and May (MPWMD 2019). Smolt migration increases with river freshets, but they may move downstream during all months of the year (MPWMD 2019). Kelts also migrate downstream after spawning in the late winter/early spring.

Data suggests the historical population in the Carmel River prior to the construction of the dams was a run size somewhere between 1,500 – 8,000 adults annually (Becker et al. 2010). The run size in 1965 was estimated to be 1,650, based on observations from local field personnel (Titus et al. 2009). Adult steelhead have been counted at LPD ladder inconsistently since 1949 and were counted at SCD until its demolishment in 2015.[4, 5] The average number of adults that have returned to LPD fish ladder since listing in 1997 has been on average 114 steelhead (MPWMD 2019). The average number of adults since 1982, when the ladder has operated continuously is 86.9.[6] In the drought years of 1976-1977, 1988-1990, and 2014-2016 no adult steelhead were captured in the trap. In addition, during the 3-year period from 1988 to 1990 and in 2014, the river never breached the sandbar at the mouth, making the river inaccessible to and from the ocean.

Redd surveys below the former SCD indicate spawning habitat has improved over the last 20 years and adults are now spawning more frequently below the former SCD, instead of migrating into the upper watershed (MPWMD 2016). MPWMD (2016) postulates that the variability of adult steelhead counts are likely the result of the recent severe 5-year drought; variable lagoon conditions, artificial manipulation of the sandbar and/or very low flows in the winter of 2014. In addition, adverse ocean conditions and low densities of juvenile steelhead in 2004, 2007, and between 2009 and 2011 are affecting subsequent adult cohorts. Improved spawning conditions in the lower Carmel River may encourage fish to spawn before they reach the former fish counter at SCD or the current fish counter at LPD, thus lowering the recorded count (but not the actual number of spawning adult fish). Steelhead also spawn in the tributaries of the Carmel River, and tributary redd surveys are limited.

From 2016 to 2019, there have been increases in the number of steelhead observed at the LPD fish ladder: 0 in 2016, then 7 in 2017, 29 in 2018 and 126 in 2019 (Figure 2). Similar to previous post-drought years, we expect steelhead numbers will continue to rebound. However, we expect numbers in the immediate future to remain well below the recovery target of 4,150 adults (NMFS 2013).

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[4] SCD was built at RM 18.6 in 1921, and LPD was constructed 28 years later at RM 24.8 in 1949. LPD is a 148-foot-high earth-filled dam on the Carmel River with an embankment crest elevation of 1,058 feet. The spillway is an Ogee crest (weir) with a crest elevation of 1039.85 feet. SCD was removed in 2015 (MPWMD 2016).

[5] The counts from SCD and LPD are partial counts and do not represent the entire population of adult steelhead that have migrated into the Carmel River. Spawning occurs in the tributaries and in the mainstem downstream of the dams.

[6] In 1987, the ladder was not operated.

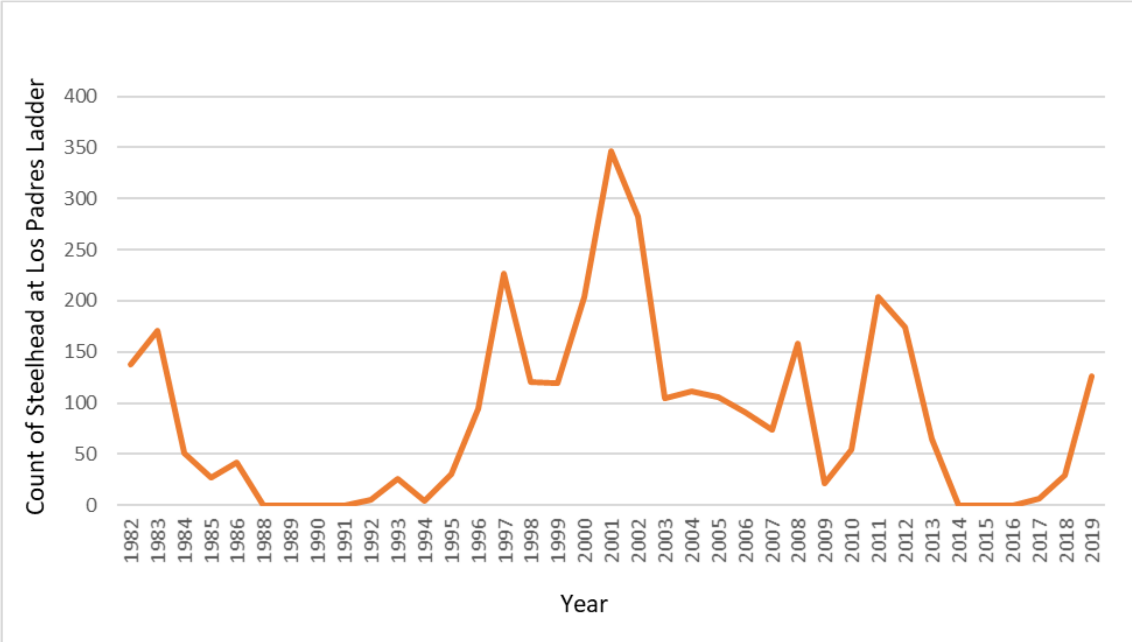

Figure 2: Counts from Los Padres Dam fish ladder from 1982-2019, excluding 1987 when the trap was not operated.

2.4.1.1 Los Padres Dam, Reservoir, and Fish Ladder

LPD is a 148-foot high earth fill dam on the Carmel River located at RM 24.8 and was built in 1948. The dam blocks volitional upstream and downstream fish passage. There is an additional 14.35 miles of high quality spawning and rearing habitat in the upper watershed above the dam. A floating weir surface collector began operating in 2016 to provide volitional adult (kelt) and juvenile steelhead passage downstream of LPD. The collector is still being evaluated for its effectiveness. During flows above 50 cfs steelhead can still use the spillway to migrate past the dam. About 250 feet downstream of LPD on the left bank, a Denil fish ladder allow upstream migrating adult steelhead to be trapped and trucked above the dam. The upstream passage structure is currently being evaluated for improvement. The fish ladder is thought to be undersized and the entrance is potentially set at too high an elevation.

While the action area for the Program ends at the base of LPD because juveniles cannot pass upstream, LPD does have influence on the action area. The water stored in the reservoir augments flows during the dry season for the purpose of providing steelhead more wetted area. But the dam affects downstream habitat conditions by disturbing natural processes (e.g. the movement of gravels, and altering the winter hydrograph).

2.4.1.2 Water Withdrawals

Wells located below the former SCD pump water from the underflow of the Carmel River. California American Water Company (CAW) operates 21 of these wells and currently may withdraw 8,310 AF/year from the Carmel River (with certain exceptions and adjustments as provided in WR 2016-00016). Additional wells are operated privately under much smaller water rights. Of these additional wells, the State Water Resources Control Board (SWRCB) has identified 14 major diverters who cumulatively divert up to 1,729 AF/year from the underflow of the Carmel River. As a result of these withdrawals, the Carmel River goes dry downstream of the Narrows (RM 9.5), usually by July of each year until the rains begin.

The District is responsible for monitoring the effects of water production on the river and to reduce the negative impacts of water diversions. A mitigation program for the Water Allocation Program formally began in July 1991. The mitigation program focuses on potential impacts related to fisheries, riparian vegetation and wildlife, and the Carmel River lagoon. Activities required to avoid or substantially reduce negative impacts to the environment include: irrigation and erosion prevention programs; fishery enhancement programs (e.g., rescuing steelhead from drying reaches and subsequent rearing); establishing flow releases from the existing dams to protect the fish and riparian habitat; monitoring and managing groundwater supplies in Carmel Valley and in the Seaside Groundwater Basin; monitoring surface and groundwater water quality; reducing municipal water demand through water conservation; and regulating activities within the Carmel River riparian corridor.

2.4.1.3 District Rescues and Operation of the Sleepy Hollow Steelhead Rearing Facility

Under the mitigation program, the Facility was constructed in 1996 to hold and rear juvenile steelhead, which are rescued from the Carmel River mainstem during the summer months (typically June through October) when the lower reaches of the river becomes dry.[7] The primary benefit of the program is rescuing many of the steelhead exposed to drying river conditions. A potential risk of the program is that Facility-reared steelhead life history patterns may be modified by being held in the facility during the dry season (see Effects Discussion Section 2.5.1.3). An additional potential risk is that translocated steelhead may overcrowd the steelhead already in perennially wet habitat (see Effects Discussion Section 2.5.1.4.1). If this is occurring, then it would likely lead to lower survival rates of the translocated steelhead and the steelhead already at the site, but this has not been confirmed or refuted by the available scientific information.

From 1996 to 2018, the District rescued a cumulative total of 444,395 steelhead (Table 3). The District rescues steelhead from all drying reaches including the tributaries that are within their jurisdiction (Figure 3). During a drought or sequential dry and critically-dry years, when streamflow is too low for adult and smolt emigrations, the District deploys a box trap and captures all steelhead moving downstream. And then transports the smolts and adults to the lagoon or ocean and juvenile steelhead to the Facility or perennial habitat. Since 1996 there has been 2,645 smolts and 110 adults relocated during rescue operations (Table 3). The box trap has

[7] The Facility did not operate in 1998, 2000, 2002, 2014, 2015, 2017, and 2018. Consistent stream flow in the mainstem precluded the need for rescues and Facility operations in 1998 and 2017. Mechanical problems prevented operations in 2000, and the Facility was closed in 2002 for a retrofit to address the problems observed in 2000. The Facility did not operate 2014 and 2015 due to drought; there was not enough water to support the inflow requirements. The Facility was closed in 2018 for construction of the Facility upgrades (see Section 1.1.1.1). The upgrades are intended to prevent future Facility shutdowns due to poor water quality and quantity because the Facility will be able to operate at a partial re-circulation mode.

been deployed in 2007, 2013, 2014, and 2015.

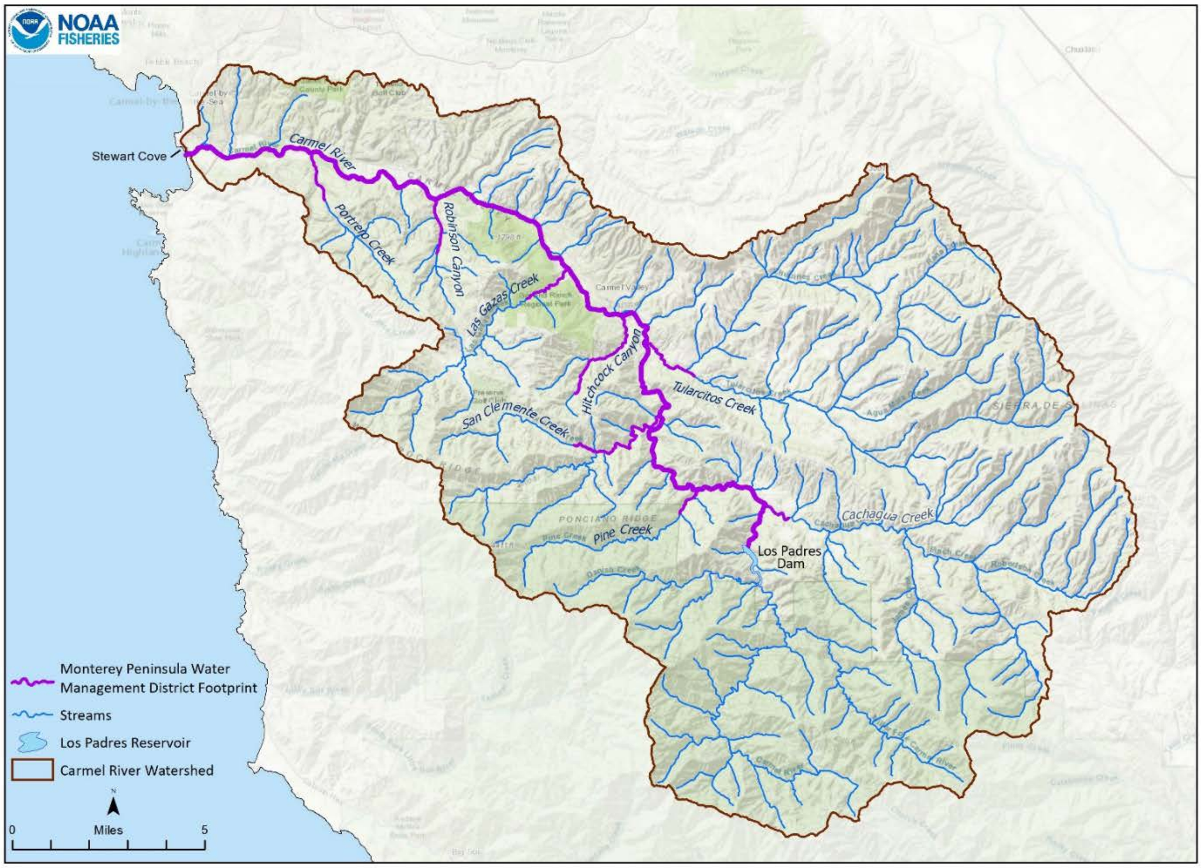

Figure 3: Map of Monterey Peninsula Water Management District's Steelhead Rescue and Release Footprint.

Since 1996, an average of 18,401 young-of-the-year (YOY), 756 1+, 115 smolts, 5 adults, and 2 kelts were rescued per year (Table 3). During wetter years, the mainstem typically does not experience dryback and only fish in the tributaries are rescued when needed. The average rate of mortality from rescue and transport activities is very low (0.62%). (Table 3). The largest rescue year was in 2008, with the majority of 84,339 rescued steelhead being YOY (Table 3).

Table 3: Steelhead rescued from the Carmel River, CA from 1996-2018 by lifestage and rescue mortality percentage. Data was taken from District annual mitigation reports and the RRMP Figure 1-3 and Table 6-4.

Year	Young of Year	Juvenile (1+)	Smolts	Adults	Kelts	Rescue Mortality Percentage	Total
1996	7616	302	0	3	N/A	0.57%	7921
1997	18812	239	749	11	N/A	0.58%	19811
1998	3143	55	0	0	N/A	0.28%	3198
1999	11991	177	0	1	N/A	0.47%	12169
2000	7536	101	0	0	N/A	0.39%	7637
2001	38473	521	0	1	N/A	1.00%	38995
2002	41880	607	29	3	N/A	1.43%	42519
2003	50994	614	33	7	N/A	1.13%	51648
2004	24228	1132	348	4	N/A	1.25%	25712
2005	20289	489	1	0	N/A	0.20%	20779
2006	14935	1401	0	2	0	0.24%	16338
2007	13739	2325	264	19	7	0.84%	16347
2008	83836	83	1	1	17	0.48%	84339
2009	12658	710	0	0	1	0.81%	13478
2010	3544	299	0	0	0	0.39%	3858
2011	1670	81	0	0	0	0.00%	1751
2012	7365	765	0	0	0	0.36%	8159
2013	47944	1500	102	14	3	0.70%	49912
2014	596	3430	1060	12	0	0.33%	5115
2015	2583	588	58	31	1	0.67%	3283
2016	651	258	0	0	0	0.88%	909
2017	5496	35	0	0	0	0.50%	5559
2018	3252	1678	0	1	0	0.54%	4958
Total	433231	17390	2645	110	29	–	444395
Minimum	596	35	0	0	0	0.00%	909
Maximum	83836	3430	1060	31	17	1.43%	84339
Average	18401	756	115	5	2	0.61%	19322

Although there have been some difficulties encountered with operations of the Facility, the District has adaptively managed the program and upgraded the facility in attempt to minimize or eliminate the problems. Many of the difficulties were associated with the drawdown of San Clemente Reservoir, since the water intake to the facility is immediately downstream of the former dam. The drawdown would result in warm water with algal flocculants, high fine sediment load, and high turbidity. The Facility in-river water pump would struggle with the high sediment load and the quality of the water was not ideal for rearing steelhead. Even during periods outside the drawdown water quality and quantity was an issue of the facility. Furthermore, there have been disease outbreaks, unintended movement of steelhead between bays[8], nearby fires, floods and unaccounted for mortality (perhaps from cannibalism). The extensive Facility upgrade in 2019 and modifications to operations (e.g. sealing the bays) have improved operations and reduced these issues.

Survival rates of steelhead reared in the Facility have varied considerably since 1996 but are currently trending upwards (Figure 4). Overall annual survival ranges from 14 to 86 percent and has an average of 54.2 percent (Table 4). Annual survival rates are attributed to a number of factors: rescue stress, inability to transition to artificial rearing, cannibalism, disease, and warm water temperatures. While survival rates as it relates to density has not been studied at the Facility directly, it does appear that when densities are higher, the overall rate of survival decreases (Figure 5).

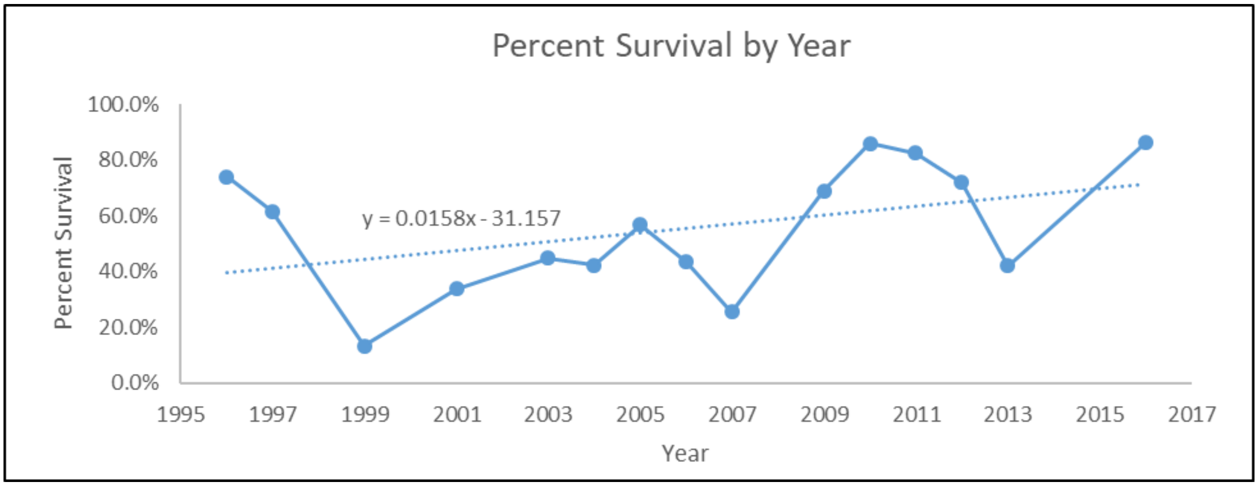

Figure 4: Annual percent survival of steelhead reared in the Facility from 1996 to 2016.

[8] Small gaps existed where the weirs attached to the rearing channel. Small steelhead found those openings and would move between the bays. After the problem was discovered the bays were sealed during the off-season.

Table 4: Number of steelhead stocked, deceased and released from Sleepy Hollow Steelhead Rearing Facility from 1996-2016. The facility has not been operated every year.

Year	Operating Days	Number of Steelhead Stocked	Number of Mortalities	Number Released	Percent Survival
1996	106	525	136	389	74.1%
1997	197	4526	1729	2797	61.8%
1999	218	11868	10277	1591	13.4%
2001	224	20662	13644	7018	34.0%
2003	166	28336	15601	12735	44.9%
2004	216	16249	9355	6894	42.4%
2005	236	24457	10546	13911	56.9%
2006	205	16418	9269	7149	43.5%
2007	239	10846	8066	2780	25.6%
2008	282	46635	31914	14721	31.6%
2009	136	12759	4084	8800	69.0%
2010	96	1957	273	1684	86.1%
2011	81	1685	292	1393	82.7%
2012	147	7417	2076	5341	72.0%
2013	135	23678	13682	9996	42.2%
2016	170	407	56	351	86.2%
Totals	2854	228425	131000	97550	42.7%
Mean Annual	178	14277	8188	6097	54.2%

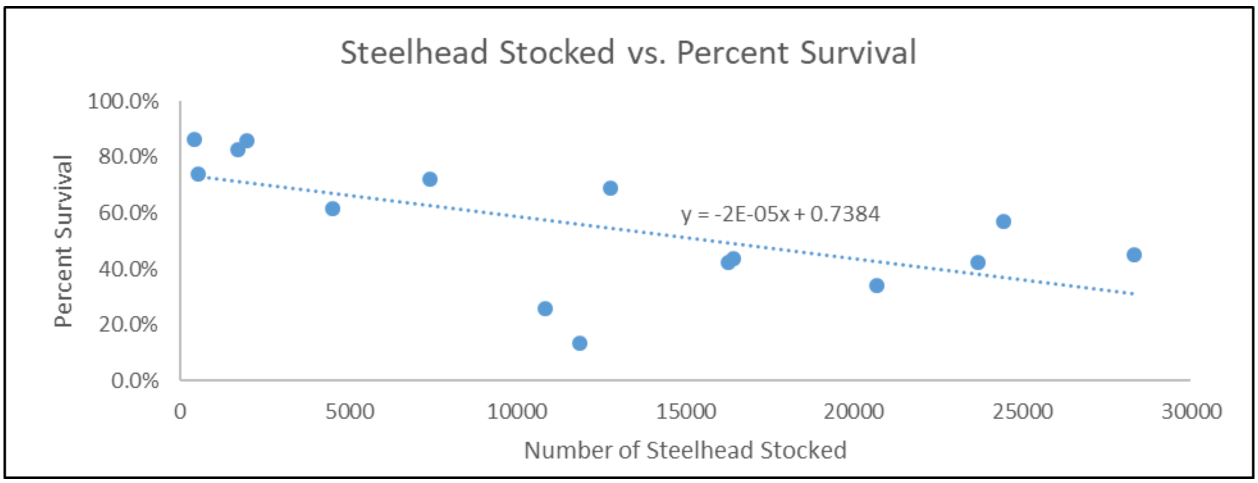

Figure 5: Number of steelhead stocked at the Facility versus the percent survival rate at release.

Comparable survival rates for perennial reaches of the Carmel River (upstream of RM 9) are currently unavailable. However, NOAA's SWFSC and the District are collecting the data necessary to develop a quantitative juvenile life history model that will be able to estimate survival rates in the Carmel River. By the end of the five year permit term (2024), there should be sufficient data to develop juvenile survival estimates in the Carmel River that can be compared to annual survival rates at the Facility.

In some years, a portion of rescued juvenile steelhead are not brought to the Facility and are instead translocated to a perennially wet portion of the river or to the lagoon. The steelhead rescued from tributaries in the upper Carmel River are translocated to the tributaries' confluence with the river. Additionally, steelhead are translocated to perennially wet habitat when steelhead densities at the Facility are at capacity or with prior approval from NMFS. Situations in which NMFS may give approval to translocate steelhead instead of bring them to the facility would be if the prior year's facility survival rate was low and a lower facility steelhead density is being tested. The maximum amount of steelhead translocated (~42,500) was in 2002, when the Facility was closed for repair. The exact numbers of steelhead translocated is unknown because reporting methods have varied over the years, but since 1996 approximately 216,000 steelhead have been translocated to the lagoon and perennially wet habitat. It is currently unknown if the carrying capacity of the river is being exceeded when steelhead are translocated. NMFS assumes that the carrying capacity is not being exceeded because there have been significant habitat improvements with the removal of San Clemente Dam. For more discussion see (Section 2.5.1.4.1). Rescued smolts and adults are released into the lagoon or the ocean (at Stewart's Cove).

2.4.2 Status of Critical Habitat in the Carmel River

2.4.2.1 Influence of Dams

Trapped sediments in the Los Padres Reservoir and the former SCD reservoir have prevented sediment from replenishing the downstream river ecosystem, which has created several major ecological changes detrimental to S-CCC steelhead. The ecological effects of large dams on river systems have been well documented (Baxter 1977; Petts 1984; Yeager 1993; Drinkwater and Frank 1994; Ligon et al. 1995; Shuman 1995; Ward and Stanford 1995; Kondolf 1997; Graf 1999; Collier et al. 2000; World Commission on Dams 2000; Bednarek 2001; Duda et al. 2008; Kloehn et al. 2008; Pess et al. 2008). The consequences are numerous and varied, and can include both direct and indirect impacts to the entire river ecosystem. Dams are known to disrupt the natural flow regime of a river, changing it from a free-flowing system to a blocked one that affects both the river's physical and biological characteristics. Dams are also known to alter sediment releases and transport. The trapped sediments are critical for maintaining physical processes and habitats downstream of the dam, including the maintenance of productive instream habitat, barrier beaches/islands, floodplains, and coastal wetlands. These same negative effects from dam presence are evident in the Carmel River system. Preliminary observations made since the removal of SCD and Old Carmel River Dam (OCRD) suggest that riverine processes are being restored at rates faster than expected (Boughton et al. 2017). The removal of the dam is increasing the quantity of quality rearing habitat steelhead can use during the dry season.

When a river has been deprived of its sediment load, the downstream river bed and banks are eroded, which leads to river channel incision or deepening of the river. This erosion leads to steeper, less stable banks at higher risk for erosion and failure. Risk of bank failure is further exacerbated from channel incision, as it exposes the root structures of riparian and wetland plants, subjecting them to scour and erosion. The damage caused by this erosion can extend for substantial distances below a dam. In general, stream bank erosion is a natural process that often results in the formation of productive floodplains, high quality instream habitat, and alluvial terraces of many river systems. Rivers and streams are products of their catchments, and are dynamic systems in a constant state of change. The factors controlling river and stream formation are complex and interrelated, and include the amount and rate of supply of water and sediment into stream systems, catchment geology, and the type and extent of vegetation in the catchment. As these factors change over time, river systems respond by altering their shape, form and/or location, therefore, even stable river systems have some eroding banks. However, the rate at which erosion is occurring in stable systems is generally much slower and of a smaller scale than that which occurs in unstable systems. In disturbed or altered systems this process can be accelerated, leading to unstable conditions. With the removal of SCD, the Carmel River will become more stable but the process will take years. During this transition the river may have a greater increase in bank erosion events.

The inherent dynamic nature of an unaltered river system can support a wide diversity of species. These species have evolved phases of their life stages to adapt and coincide with a river's variability. Thus, when this natural variability is disrupted by altered or blocked flow associated with dams, the biological response can be decreased species richness (e.g., diversity and abundance) of aquatic organisms. The annual biological assessments conducted by the District indicate that the benthic macroinvertebrate indices (BMI) at the site immediately downstream of the former reservoir has seen an increase in the BMI values since the removal of SCD (MPWMD 2018). The relatively quick BMI score increase was a result of 2016-2017 storms, which significantly moved sand and gravel from the SCD re-route channel downstream. Benthic macroinvertebrates are a key food source for juvenile steelhead. Instream sediment particle size, water quality, and flow regime are key factors in controlling the distribution and abundance of benthic invertebrates.

2.4.2.2 Invasive Species

A currently small but potentially growing threat, in 2016, BMI data showed the presence of the introduced New Zealand Mud Snail (*Potamopyrgus antipodarum*). The mud snail comprised over 60% of the BMI in the samples (MPWMD 2018). High abundances of the New Zealand Mud Snail are known to adversely affect fish populations by being a poor food source and displaces the indigenous BMI populations that are the preferred food source for most fish species (Vinson et al 2007).

Another factor that could be affecting the quality of habitat and survival of steelhead in the lagoon is the recent and persistent presence of non-native striped bass (*Morone saxatilis*). CDFW began a Striped Bass Removal Project in 2008, and have continued with varying degrees of effort. The quantity and threat of striped bass in the lagoon is taken into account when decided if any juvenile steelhead will be translocated to the lagoon.

2.4.2.3 Water Withdrawals and Storage

The aggregate effects of the water withdrawals and the resulting drying up of a portion of the lower river reduce the carrying capacity for juvenile steelhead rearing in the river. The lowered groundwater tables and drying of the lower river also diminish the availability for adult migration in winter, and smolt outmigration in the spring. Substantial rainfall is needed to recharge the aquifer before surface flows reach the ocean. In the drought years of 1988 to 1990, the river flow receded in the lower eight miles of the river and failed to breach the sandbar.

During the most recent drought, the river failed to breach the sandbar in the winter of 2013-2014. Reduced surface flows and lowered groundwater tables also create poor water quality conditions and lowered water levels in the lagoon, which can result in reduced growth and mortality of rearing fish.

In 2002, CAW agreed to implement the long-term supplemental water project to reduce its diversions from the Carmel River and is still working to do so. The project includes the construction and operation of a seawater desalination plant, which will include intake and discharge facilities, water transmission pipelines, storage reservoirs, pump stations, and aquifer storage and recovery facilities. With the implementation of the GWR Project, increased storage capacity of the Aquifer Storage and Recovery project (ASR) and the closure of the Rancho Cañada Golf Course less water is being diverted from the Carmel River each year. During several consecutive dry years, as seen between 2012 and 2016, dry-back distances ranged from 6-10 miles. By extending the duration and volume of freshwater flows the habitat conditions for steelhead in the lagoon and stream will improve. However, overall dry-back conditions are expected to persist and steelhead will continue to need to be rescued and reared at the Facility.

2.4.2.4 Soberanes Fire and Drought

The Soberanes Fire started on July 22, 2016, from an illegal campfire and burned a significant region of the Carmel watershed (Potter 2016; Chow et al. 2017). The fire burned for 10 weeks and burned approximately 132,130 acres along the Big Sur coast in the Los Padres National Forest, Ventana Wilderness, and lands in Monterey (Potter 2016).The streams and environment are not just impacted from the fire, the methods to put out the fire can also be harmful. The fire suppression chemicals, water withdrawals, lack of screens during water withdrawals and alterations to the environment in an attempt to contain the fire may harm the watershed. The winter following the fire resulted in large quantities of burned logs and sediment washed into Los Padres Reservoir. Since the fire, there has been more water in the upper Carmel watershed and it is thought that this is because less vegetation is drawing from the river.

Carmel River experienced one of the worst droughts on record from 2012-2016 The drought was declared a State emergency in 2014. The influence the drought had on the stream was a significant decrease in stream flows and an upward trends in dry-back lengths during these years. The water level was so low in the Carmel that the Facility did not have enough water to operate[9]. During the winter of 2013-2014, river failed to breach the sandbar and no adult steelhead were able to spawn that year. The winter storms of 2016-2017 officially ended the California drought.

2.4.2.5 Climate Change and the Carmel River

The long-term effects of climate change have been presented in Section 2.2.2.10; Global Climate Change. These include temperature and precipitation changes that may affect steelhead and critical habitat by changing water quality, streamflow levels, and steelhead migration in the action area.

The threat to S-CCC steelhead in the Carmel River from climate change is likely going to mirror what is expected for the rest of Central California. NMFS expects that average summer air

[9] This was prior to the water upgrade. Now the Facility would be able to switch to partial re-circulation mode under these same circumstances.

temperatures in the Carmel would continue to increase, heat waves would become more extreme, and flood, droughts and wildfire would occur more often (Hayhoe et al. 2004; Lindley et al. 2007; Schneider 2007; Westerling et al. 2011; Moser et al. 2012; Kadir et al. 2013). Many of these changes are likely to further degrade S-CCC habitat in the Carmel throughout the action area. During the short time frame of the action (5 years), we expect current conditions, and any current influences of climate change, will predominate. Climate change impacts are difficult to discern at short time scales because natural climate variability predominates (Cox and Stephenson 2007; Santer et al. 2011).

2.4.2.6 Translocated Steelhead Release Locations

In some portions of the upper river the substrate is dominated by large boulders and bedrock outcrops and is poor spawning habitat, but does contain good rearing habitat. Downstream from this bedrock and throughout most of the perennial reach there is good spawning, incubation and rearing habitat with ample amount of water, riparian cover, and habitat complexity . Rearing is sustained or enhanced by minimum summer stream flows released from LPD. There are sporadic augmentations of spawning gravel in this reach to compensate for the gravel that is retained by LPD. While the success of these augmentations has not been quantified, they are providing the gravel size that steelhead use for spawning. There will be another augmentation of spawning gravel in fall 2019.

Steelhead are also released into the Carmel Lagoon. The Carmel Lagoon develops after a sandbar forms at the mouth of the river, typically in late spring or early summer. The greater lagoon area consists of a variety of wetland habitat types including open water habitats in the main lagoon, seasonally flooded willow riparian forest and scrub shrub areas, emergent tule marsh, mudflats, and beach dunes (Casagrande 2006). The Carmel Lagoon provides important PBFs for steelhead rearing and migration. During the dry season, when flow in the lower river and wave energy decline, sand accumulation on the beach forms a sandbar which begins to impound a mixture of freshwater inflow and trapped seawater. Habitat suitability for steelhead in the Carmel Lagoon changes seasonally and is directly related to changes in water quality and depth (Casagrande et al. 2002; Casagrande and Watson 2003). In seasonally closed lagoons, such as Carmel, each of these parameters is driven primarily by the timing of sandbar formation and both the volume and duration of freshwater inflow to the lagoon. The sandbar typically forms in late spring or early summer, as river flows decline and reduced wave energy allows for increased sand deposition on the beach. Water quality (temperature and dissolved oxygen) is often impaired throughout the summer and fall. Lagoon water quality will determine if any translocated steelhead will be released there. Smolts and adults/kelts will be released either in the lagoon or the ocean at Stewart's Cove. Stewart's Cove is just north of the lagoon, located in Carmel-by-the-Sea. It has nearby vehicle access and because it is a cove, it is sheltered from the open ocean. NMFS expects it provides adequate nearshore habitat conditions for smolts, adults, and kelts. For example, the area is part of the Carmel Bay State Marine Conservation Area and known to provide diverse shallow habitats.[10]

[10] Carmel Bay State Marine Conservation Areas: https://www.wildlife.ca.gov/Conservation/Marine/MPAs/Outreach-Materials#26716428-mpa-overview-sheets

2.4.2.7 Release Locations of Facility Reared Steelhead

Steelhead reared at the Facility will be released to approximately the same location from which they were rescued, typically the lower five to nine miles of the river. The steelhead are released two to four weeks after the river re-wets. The lower river has been undergoing a lot of changes since the removal of SCD. There has been an intrusion of fine sediments from the dam that have been making their way down the river and now have been observe all the way to the lagoon. As these fine sediments wash out, the quantity of spawning habitat will likely improve. Because of the District's riparian vegetation program, the river vegetation does not die with the annual dewatering. The lower river does not have much floodplain habitat and this is likely limiting the amount of winter rearing habitat for juvenile steelhead.

2.4.3 Previous Section 7 Consultations and Section 10 Permits in the Action Area

NMFS has completed ten formal section 7 consultations on actions within the action area (entire Carmel watershed). They were all non-jeopardy and most anticipated small amounts of incidental take that were unlikely to affect future steelhead returns. One consultation (with one reiniaition) was for the removal of SCD and Old Carmel River Dam, which had major habitat restoration benefits. The project improved passage, improved water quality, and helped restore natural processes. NMFS completed a consultation for the Facility water upgrade that was finished summer 2019.

Another consultation in the action area, was for the entering into the proposed memorandum of agreement (MOA) among CAW, NMFS, and the California State Coastal Conservancy. The Parties entered this MOA in order to further the conservation and recovery of S-CCC steelhead. The MOA includes an agreed upon set of activities for California-American Water Company (CAW) to operate for the next six years (2017 to 2023) in a way that reduces impacts to S-CCC steelhead while CAW undertakes actions to eliminate unauthorized diversions from the Carmel River, with the goal of terminating all unauthorized diversions from the river by December 31, 2021. Over the term of the MOA and while CAW develops an alternative water supply, CAW will limit their diversions from the Carmel River to the EDL of 8,310 – 9,060 AF/year. By the end of the MOA (2023) and with the implementation of the WR 2016-00016, CAW's summer diversions from the Carmel would be reduced to 3,376 AF/year. This reduction in pumping will dramatically increase the amount of water available for steelhead during the dry season.

NMFS has completed 15 informal consultations on actions within the action areas. Six informal consultation were completed for Carmel lagoon breaching, operations and restoration projects. Seven informal consultations related to San Clemente Dam removal and annual water drawdown. The other two projects were for the maintenance of a water well and bridge. The letters of concurrence analyzed the effects of each project and concluded that the projects were not likely to adversely affect S-CCC steelhead or designated critical habitat.

2.5 Effects of the Action

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

NMFS identified the following effects:

- Capture and Transport: capture from the rescue operation and transport to either the Facility or translocation to perennial habitat, lagoon, or the ocean.
- Facility Survival Rates: facility design and operations' effect on steelhead interactions and survival.
- Genetic and Life History Variation: the effect of rearing in the facility on wild steelhead fitness.
- Translocation: potentially exceeding the river's carrying capacity, ocean translocation, and spread of disease.

NMFS also analyzed the effect of the Facility's discharge water on the adjacent river.

The quantity of steelhead that need to be rescued annually will be variable and depend on the water year type, water withdrawals, quantity of 1+ juveniles, winter adult returns and success of spawning and egg incubation. In regards to water withdrawals, until December 31, 2021, CAW will limit their diversions from the Carmel River to an annual diversion limit (i.e., EDL) of 8,310 to 9,060 AF/year, (WR 2016-0016). We anticipate under this withdrawal scenario the length of dry-back in the river mainstem to range from 2 to 7 miles. Steelhead would also need to be rescued from the tributaries, which is not affected by CAWs water withdrawals. The maximum amount of steelhead that will be brought to the facility is 51,585. Since 1996, this number has only been exceeded twice (51,608 and 83,919). If the rescue densities exceed 51,585, then the remaining steelhead will be translocated to perennial habitat.

2.5.1 Effects to Steelhead

2.5.1.1 Capture and Transport

Juvenile (fry, YOY, yearling), smolts and adults (kelts) may need to be rescued from the river when flows recede depending on the water year. They will be rescued by electrofishing, seine/dip net or downstream box trap. Rescued steelhead will then be transported either to the Facility or translocated based on their lifestage (e.g., smolts and adults will be released in the estuary or ocean).

Fish relocation activities pose a risk of injury or mortality to rearing juvenile salmonids. Any fish collecting gear, whether passive (Hubert 1996) or active (Hayes et al. 1996) has some associated risk to fish, including stress, disease transmission, injury, or death. In addition, rescued steelhead experience higher stress levels from increased stream temperatures and lower flows typically present during the rescue season (Grantham et al. 2012). Capture and transport may cause additional stress on fish rescued from poor habitat conditions. Stress can have a multitude of effects on fish, including immune system suppression, reduced growth rates, and behavioral changes. Electroshocking, seining, handling, chasing, and transport are forms of acute stress in fish. Acute stress causes increased metabolic rates and higher cortisol levels in the blood (Barton and Schreck 1987; Vanderkooi et al. 2001). Energy is directed away from somatic growth and immune system response and towards stress coping (Vanderkooi et al. 2001). Cortisol levels typically return to pre-stress levels within 24 hours following a single exposure to a stressor (Vanderkooi et al. 2001); however, exposure to regular stressors results in a cumulative stress response (Barton et al. 1986). The stress caused by electroshocking fish has the potential to reduce growth rates in steelhead for up to 35 days following exposure (Gatz et al. 1986; Dwyer and White 1995).

Stress inflicted on steelhead during rescue operations is unavoidable, yet if they were not rescued, their fate would be death from desiccation or predation. Thus, the net effect is ultimately a better chance of survival than would be expected if the steelhead remained in the drying streams. Measures can be taken to minimize the magnitude and duration of stress exposure such that chronic immune suppression and reduced growth rates do not occur. Steelhead handling and electroshocking will be limited to the minimum necessary to capture and transport them to and from the rearing facility. Other capture methods, such as seining, will be prioritized and electrofishing will be used when other methods have been exhausted or are not feasible (e.g. dense vegetation or very rocky substrate). The amount of unintentional injury and mortality attributable to fish capture varies widely, depending on the method used, the ambient conditions, and the expertise and experience of the field crew. Since fish relocation activities will be conducted by qualified fisheries biologists following NMFS electrofishing guidelines (NMFS 2000) and other standards for seining and relocating salmonids, direct effects to, and mortality of juvenile salmonids during capture and relocation will be minimized.

Notwithstanding the stressful conditions present during rescues, NMFS anticipates the number of fish injured or killed during rescue and relocations will be five percent or less. The juveniles are mostly fry and YOY and are already stressed from low water quantity and quality and thus are easily killed. Using a 5 percent mortality rate and a likely annual maximum of 105,300 juvenile (fry, YOY, and yearlings) steelhead rescued and relocated in 1 year, the maximum amount of juvenile steelhead likely to be killed or injured in any given year over the next 5 years would be 5,265 juvenile steelhead. The same logic can be applied to estimate the number of smolts and adults that may be encountered, killed, or injured during rescue and relocation activities. The likely maximum of smolts captured in 1 year is 5,400. If injury and mortality rates reach maximum levels (5 percent of steelhead rescued/transported), approximately 270 smolts may be injured or killed annually. We expect that 5% of smolts may die from rescue operations because the smolts have already migrated in the watershed when it has critically low water levels. The stress of that migration added to the stress of being rescued may result in death. Adults and kelts are usually only encountered when the box trap is operated in critically dry years.[11] The maximum number of adults and kelts likely to be captured in one year is ten and ninety, respectfully. There is no anticipated death or injury of adult steelhead (pre-spawned) because the District rarely encounters adults and during the past 23 years no adults have died as result of the Program. A higher rate of mortality (5.5 percent) is attributed to kelts because their poor physical condition when they are encountered. If injury and mortality rates reach maximum levels (5.5 percent of steelhead kelts rescued/transported), approximately 5 kelt may be injured or killed annually. In sum, some steelhead are likely to be killed or injured during rescue and relocation activities, especially in dry and critically dry years.

2.5.1.2 Facility Survival Rate

As described above, most of the rescued steelhead will be transported to the Facility in most

[11] The box trap was deployed in 2007, 2013, 2014, and 2015.

years. Facility operations and design dictate overall survival rates at the Facility by directly impacting fish condition, health, and behavior. The Facility is unique in that most steelhead are reared in the rearing channel, a flow-through channel with pool and riffle segments that are filled with cobble and wood (referred to as bays). The intent of this design is to create an enriched artificial rearing habitat. But the rearing channel may actually be contributing to increased steelhead aggression, increased fish densities, stress, and size variation, which in turn impact survival rates. Ross et al. (1995) notes that in rectangular, flow through design systems there is more efficient aggression by and increased dominance of larger fish, increased density, and increased contact with both other fish and tank walls. The larger more dominate steelhead are able to defend the areas that receive the most food and have structure, forcing the weaker fish to the riffles and with potentially less access to food and cover. Steelhead are sorted by size when initially placed into the individual bays but because of the structure and design of the rearing channel the District is not able to re-sort them throughout the rearing season by size, leading to increased rates of cannibalism.. These behaviors contribute to exaggerated size discrepancies of steelhead in each bay. The aggressive steelhead increase the density of the remaining weaker steelhead because they are crowded together in the riffle habitat. In addition to the aggression and dominance behavior instigated by the current rearing channel design, the design fosters unhygienic conditions. The cobble and wood structures inserted in the rearing channel preclude cleaning other than once a year before the rearing season begins. The District attempts to mitigate this issue through certain practices. For example, fish in the rearing channel are mostly hand fed to minimize overfeeding. Overfeeding can leave uneaten food to decompose in the channel, contributing to unhygienic conditions, if food is provided when fish are no longer hungry.

Crowding has been found to lead to chronically suppressed lymphocytes circulating in the bloodstream of rainbow trout (Pickering and Pottinger 1987), meaning their immune system response is chronically suppressed, and they can become less disease resistant. Furthermore, social hierarchies established between fish of different size or age classes may lead to subordinate fish to undergo more severe stress responses (Sloman et al. 2001). The impacts of stress on mortality due to disease may vary depending on the type of infection; however, infections may progress more rapidly in fish subjected to stress (Angelidis et al. 1987; Vanderkooi et al. 2001). Stress-related immune deficiencies are a major contributing factor of survival in the Facility since steelhead come into the Facility with a relatively high baseline stress level from the harsh conditions they were exposed to in the river prior to relocation. With the 2019 Facility upgrades, the District now has sufficient mechanisms to address disease outbreaks in the Facility, such as killing disease vectors with UV filtration and reducing water temperature.

Crowding and territoriality can also lead to cannibalism within the rearing channel. Cannibalism appears to be fairly common in wild populations of steelhead, though not at the levels observed in the rearing facility. Steelhead are known to be opportunistic feeders that forage on each other when other fish and invertebrate resources are scarce (Hecht et al. 1993; Bell et al. 2011; Woynarovich et al. 2011; Rundio and Lindley 2019). Literature suggests that fish eating other fish, including cannibalism, is more likely when other food resources are sparse (i.e. in winter and low-productivity systems) and when multiple size or age classes are present (Bell et al. 2011; Rundio and Lindley 2019). In hatcheries, differences in individual fish size, increased aggression, and cannibalism are considered indicators that food is insufficient or unevenly distributed (Woynarovich 2001). Cannibalism is both a cause and an effect of size variation (Hecht et al. 1993). Different success at feeding leads to variation in fish sizes; the larger fish are then able to prey on smaller fish and this high-energy diet results in faster growth rates and then even larger fish (Hecht et al. 1993). Cannibalism is considered a function of fish density and feeding regimen (Hecht et al. 1993; Woynarovich et al. 2011). As opportunistic feeders, steelhead may be more prone to cannibalism when on a restricted feeding regimen and when food is unevenly distributed.

The District has been adaptively managing the Facility, and survival rates have been largely increasing (Figure 4). To minimize the negative effects discussed above, and to continue the trend of increase survival rates, the District has agreed to start removing the wood and cobble from some of the artificial channel bays and has already removed all the filter boxes in the artificial channel which were not functioning. The removal of the filter boxes drastically increased the volume within each bay (i.e. space for fish). The District has agreed to lower the stocking densities of steelhead in each bay (see rearing densities, section 1.3.3.3). Lower densities will lead to less intraspecific competition as discussed above. The volume of the bays increased where the District removed the filter boxes and structure. So the same amount of steelhead can be stocked into the facility as in previous years and now have a greater volume of rearing space. The District has also agreed to try to randomize their feeding by moving the placement of the belt feeder and not hand feeding in a predictable pattern. This will encourage the steelhead to move around more within each bay and give the weaker fish more access to the preferred habitat and feeding areas. Spatially randomizing feed distribution and distributing feed more evenly will likely reduce size variation and territoriality. Nonetheless, steelhead densities in the facility will be greater than the densities in the river.

In addition to issues related to overcrowding, historically, water quality has also reduced survival rates in the Facility. Water temperatures in the Carmel River at the Facility often exceed levels considered suitable for juvenile steelhead, let alone acceptable for rearing juvenile fish at higher densities in an artificial setting. The Facility is now able to reduce water temperatures more effectively, treat the water with UV, and operate in a partial re-circulation mode. High water temperatures, when combined with parasites (Ichthyophthirius sp.) and bacterial infections, lead to increased rates of steelhead deaths. With the removal of SCD and the extensive Facility upgrades (see section 1.3.2.2 in the project description) completed in the summer of 2019, we anticipate water quality will be improved and have lower mortality rates related to water quality. In addition, the Facilty is periodically tested for disease (see below, section 2.5.1.4.2). But since the upgrade has not been tested, NMFS will review annual reports to ensure our assumption of water quality improvement are correct.

The average survival rate at the facility is 54.2%. NMFS believes that during the 5 year term of the permit that the survival rate should improve because of the extensive Facility upgrades, lower rearing densities, randomized feeding regime and the removal of SCD (contributed poor water quality). But since none of these improvements have been tested, we will assume that the survival rate will continue to be 55%. If the maximum capacity of the facility is met then 51,585 steelhead will be brought to the facility and it is expected that 23,236 will die during their stay at the Facility and during transport for release. An additional 150 steelhead will be sacrificed for disease testing.

2.5.1.3 Genetic and Life History Variation

Life history expression of steelhead is influenced by both genetic makeup and environmental conditions (Doctor et al. 2014; Berejikian et al. 2016). There is an abundance of evidence suggesting hatchery-reared salmonids have deleterious effects on genetic variation and heritability of wild populations (Lynch and O'Hely 2001; Araki et al. 2007; Satterthwaite and Carlson 2015). This is especially true when hatchery broodstock represent a relatively small proportion of natural genetic variation (Berejikian and Ford 2004; Araki et al. 2007). Van Doornik et al. (2010) has shown that supplementation programs that incorporate sufficient genetic diversity do not cause substantial changes to genetic diversity or effective population size. Captivity-reared populations representing the genetic diversity of the population thus avoid the issues typically associated with inbreeding, such as loss of genetic and life history variation. This is the case for steelhead reared in the Facility, which are the progeny of wild steelhead rather than of hatchery broodstock, meaning their genetic variation mimics that of the wild population (wild-reared).

Environmental conditions can also act on growth-mediated life history traits that may influence life history expression (Doctor et al. 2014; Berejikian et al. 2016). For example, incubation and rearing in artificial conditions exerts selective pressures on growth rates, body size, competition, and predator avoidance (Berejikian and Ford 2004; Fritts et al. 2007; Berejikian et al. 2016). In particular, the temperature and feeding regimens steelhead experience during captive-rearing directly impact their growth rate and thus their size at smolting. Similarly, competition and stress resulting from hatchery conditions may indirectly influence growth rate and fish size. The variation in growth rates from captive rearing conditions could have a direct consequence on a population since the age and size of steelhead at smolting is correlated with marine survival, with larger smolts having a higher rate of survival (Doctor et al. 2014, Bond et al 2008). However, steelhead are reared at the Facility for relatively short time periods (178 days on average) compared to the one- to two-year rearing period of most steelhead hatcheries. Christie et al. (2011) states that minimizing time in captivity is a way to reduce the impact of the culture environment on hatchery-reared fish. We believe the relatively short time periods that steelhead are kept in the Facility will limit the impact of captive-rearing conditions on phenotype and behavior.

2.5.1.4 Translocations

2.5.1.4.1 Overcrowding of Perennial Reaches

The maximum amount of steelhead that can be brought to the Facility is 51,585, if 105,300 juvenile steelhead are rescued (maximum allowed under this permit), then potentially 53,715 steelhead would be translocated to perennial habitat. Since 1996, this Facility capacity has only been exceeded twice (51,608 and 83,919). Nevertheless, while unlikely, the variability in annual steelhead cohorts make these translocation quantities a possibility that must be considered. For this analysis, NMFS has assumed that the carrying capacity in the perennial reaches, lagoon, and ocean are not being exceeded by steelhead translocations. We are basing this assumption on the following: 1) large restoration projects (removal of SCD and OCRD) have increased the amount of quality spawning and rearing habitat, and 2) adult returns appear to be increasing, but remain well below the recovery target for this watershed (NMFS 2013). Taken together, NMFS expects rearing habitat space will be available nearby for juvenile fish in perennial reaches should they experience crowding from the addition of translocated fish. NMFS acknowledges that modeling efforts by Arriaza et al. (2017) suggest that translocations of steelhead to the upper river are exceeding the river's carrying capacity in these locations. This could lead to a reduction in growth rates of river-rearing steelhead in the upper river, although Arriaza did find there was variation across sample sites. In addition, Arriaza et al. did not find evidence that the potential carrying capacity exceedance has led to decreased survival rates. NMFS expects this lack of evidence likely reflects the recent availability of additional rearing habitat from the dam removal projects noted above. If new evidence indicates that our assumptions regarding carrying capacity and survival rates in the perennial reaches are invalid, we will re-initiate consultation.

Smolts and adults (kelts) are translocated to either the lagoon or the ocean. We do not expect these translocations to have any adverse impact to these environments or the steelhead already at the site. The smolts and kelts were already emigrating to the ocean but were blocked because of the lack of water. The steelhead will disperse in the estuary or ocean and not experience any additional stress from overcrowding, competition, or predation than would have naturally occurred.

2.5.1.4.2 Disease and Pathogen Transfer

As required by California State Fish and Game Code for aquaculture facilities, the Facility has always operated under the oversight of and consultation with CDFW's Fish Health Lab in Rancho Cordova. The Facility is subject to periodic random inspections, and whenever there is a disease outbreak the District consults with the lab and may overnight mail fresh specimens for necropsy. There have only been four instances of significant disease problems since the facility has been operated. Prior to release, the District will send a subsample of steelhead to the lab for inspection or have a fish pathologist certify that the steelhead are healthy. If any problems are observed by the pathologist, they will consult the CDFW Fish Pathology Lab, and send any fresh necropsy samples by overnight mail. These minimization measures will ensure that the Facility reared steelhead will not be introducing diseases to the river-reared steelhead. In addition, the sacrificed steelhead will help the District diagnose and treat any disease outbreaks at the Facility more efficiently. A maximum of 150 juvenile steelhead per year will be sacrificed for disease and pathogen testing.

2.5.2 Effects to Critical Habitat

All effluent leaving the Facility is monitored to document that it meets all receiving water quality standards and does not impair steelhead critical habitat. The water quality in the inflow and outflow is measured for standard water quality parameters (temperature, pH, carbon dioxide, dissolved oxygen, conductivity, ammonia, nitrates, nitrites, hardness, and turbidity) on a monthly basis to demonstrate that the Facility has had no impact on the river. Due to the nature of the rearing channel design that includes natural cobble, and volcanic rock acting as an additional filter in the three final bays of the outlet channel, the effluent from the Facility has been demonstrated to often be of better water quality than the river inflow on most parameters, and no worse on any of them. The quarantine tank's effluent is discharged to a separate ozonation treatment system, monitored for the only chemical used, a concentration of formaldehyde, and not released until it meets water quality discharge specifications. The data are provided the CC-RWQCB on an annual basis. Based on annual reports, the CC-RWQCB has continued to issue the Facility a General Waiver for Specific Types of Discharges in 2008 and 2014.[12]

UV filtration of rearing waters will be able to be performed under multiple flow scenarios with the newly constructed water upgrade for the Facility. This includes various percentages of water from recirculation and direct flow from the river. UV settings to treat the water will be set to target the known pathogens that have shown to be a problem at the Facility in the past. The water for the Facility is diverted from the Carmel River, therefore, wild steelhead in the river were very likely already exposed to any pathogens going into the Facility.

As described above, NMFS anticipates only a temporary reduction in rearing habitat quality (reduction in habitat space from crowding) in perennial reaches from the addition of translocated fish. This impact will be minor and cease once fish disperse to less crowded habitat. Based on our analysis, NMFS finds that it is improbable that the operations outlined in the RRMP will have more than minor and temporary effects to critical habitat.

2.6 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Three projects with beneficial cumulative effects are reasonably certain to occur and are discussed below. No non-federal activities with detrimental cumulative effects are anticipated other than those described above in the environmental baseline that are likely to continue into the future, such as water withdrawals.

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

2.6.1 Rancho Cañada Village Project

The Rancho Cañada Village Project is reasonably certain to occur in the near future with the completion of the Final Environmental Impact Report (FEIR) under the California Environmental Quality Act in December 2016 (County of Monterey 2016). NMFS submitted a comment letter to Monterey County Resource Management Agency on August 23, 2016, regarding the Recirculated Environmental Impact Report. The project proposes to redevelop up to 80 acres of the existing Rancho Cañada Golf Course to install a 281-unit subdivision of residential lots. The 270-acre Rancho Cañada East and West Golf Courses has closed its business

[12] The water board now operates under a new General Aquaculture Permit; ORDER NO. R3-2019-0001 NPDES PERMIT NO. CAG993003 WASTE DISCHARGE REQUIREMENTS NPDES GENERAL PERMIT FOR DISCHARGES FROM AQUACULTURE FACILITIES AND AQUARIUMS.

as a result of this project, thus removing two golf courses from the area, effective January 2017. Additionally, the Trust for Public Lands has purchased 140 acres of riparian and upland habitat for riparian and upland habitat protection and restoration by the Monterey Peninsula Regional Park District, and is planning to acquire the remaining 50 acres of the former golf course. The Trust for Public Land plans to dedicate unused water rights for instream beneficial use beyond that needed for park/open space use. The SWRCB plans to implement conditions in the appropriative water rights of the applicant to maintain minimum instream flow requirements calculated for the Carmel River by NMFS (2002). The FEIR estimates that the Rancho Cañada Golf Course on average used 409.6 AF/year (1991-2004) and that the new proposed project at a minimum will reduce groundwater pumping by 33 AF/year (ICF International 2016). The worst case scenario is a moderate reduction ensuring some degree of pumping reduction from the river which would benefit S-CCC steelhead.

2.6.2 Pure Water Monterey Groundwater Replenishment Project (GWR Project)

The GWR Project is being developed by the Monterey Regional Water Pollution Control Agency in partnership with the District to create a new water supply source to offset existing water supply sources in areas of northern Monterey County. The purpose of the GWR Project is to: (1) create 3,500 AF/year of purified recycled water for recharge of the Seaside Groundwater Basin, which would provide a replacement water supply for CAW and allow them to reduce diversions of equal amount from the Carmel River; and (2) provide additional recycled water for agricultural irrigation in the northern Salinas Valley, which could reduce pumping from the Salinas Groundwater Basin. The agreements to accelerate the GWR Project indicate that it will provide a new water source was signed in 2018. Water will start injecting into the Seaside Groundwater Basin later summer 2019. After the Operational Reserve is injected, CAW can begin to recover 3,500 AF/Year of water from the Seaside Wells which will be used to offset the over pumping on the Carmel River.

In any year that CAW delivers water stored in the Seaside Groundwater Basin as part of the GWR Project to its customers for use, the Effective Diversion Limit (EDL) would be reduced by one acre-foot for every acre-foot of GWR Project water delivered. If this reduction will result in the EDL for that year being lower than CAW’s available lawful diversions from the Carmel River in that year, CAW may apply to the Deputy Director for a limitation of this condition such that the provision will not limit lawful diversions. This provision will result in more water being left in the Carmel River for steelhead, and improve critical habitat because the river would experience less frequent, shorter durations, and/or shorter distances of dry-back.

2.6.3 Future CAW Diversion Reductions in Accordance with State Water Board Orders

In accordance with WR 2016-0016, CAW will maintain an EDL of 8,310 AF/year from the Carmel River from the start of WY 2015-2016 until December 31, 2021, as long as alternate water supply projects meet defined approval and construction milestones (WR 2016-00016). CAW must meet a milestone for each water year from WY2016-2017 until the end of December 2021. If CAW fails to achieve a milestone by the last day of the water year, then the EDL would be reduced by 1,000 AF/year for the following water year. The limit for WY 2021-2022 would be 4,310 AF/year until the end of December 2021. Reductions in CAW’s EDL would equate to increased Carmel River streamflow (less dry-back).

2.7 Integration and Synthesis

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

Although steelhead are present in most streams in the S-CCC DPS (Good et al. 2005), their populations are significantly less than historical estimates, fragmented, unstable, and more vulnerable to stochastic events (Boughton 2006). Most of the approximately 1,251 miles of stream critical habitat (70 FR 52488) are degraded. Severe habitat degradation and the compromised genetic integrity of some populations pose a serious risk to the survival and recovery of the S-CCC steelhead DPS (Good et al. 2005), such that they are likely to become endangered in the foreseeable future (Good et al. 2005; 76 FR 76386; Christie et al. 2011; Williams et al. 2011; 81 FR 33468; Williams et al. 2016).

Steelhead in this DPS have declined in large part as a result of anthropogenic influences associated with agriculture, mining, and urbanization activities that have resulted in the loss, degradation, simplification, and fragmentation of habitat (NMFS 2013), and to some degree disease and predation. However, the greatest threats to the S-CCC steelhead DPS populations are the degradation of habitats, impassable dams, surface water withdrawals, and groundwater extractions (NMFS 2013). Natural environmental variation (floods and droughts) have also periodically reduced spawning, rearing, and migration habitats. In recent history, the DPS experienced one of the worst California droughts on record (2012 to 2016) and in addition, the Carmel River watershed experienced a large wildfire. Unfortunately, the threats from projected climate change are likely to exacerbate the effects of environmental variability on steelhead and their habitat in the future. Thus, increased environmental variability resulting from projected climate change is now recognized as a new and more serious factor that may threaten the recovery of the S-CCC steelhead DPS (Williams et al. 2011, Williams et al 2016).

The current conditions within the action area are indicative of the DPS-wide conditions noted above. The Carmel River once contained the largest southernmost steelhead run in the present range of the S-CCC steelhead DPS, yet by 1975 the annual run had declined by an estimated 75 percent (NMFS 2013). These declines have largely been attributable to passage barriers limiting access to historic spawning and rearing areas, summertime pumping from wells for water supply, and extensive habitat fragmentation and degradation. The removal of SCD is expected to restore a more natural dynamic coarse sediment, and large wood movement in the action area, which should benefit steelhead by improving habitat (Boughton et al. 2017). Currently fine sediment from the dam are moving down river and flushing into the ocean (Kevan Urquhart, Personal Communication April 2019). The removal is also expected to benefit steelhead by enabling all life stages of steelhead to more easily move through the former dam site (Boughton et al. 2017). Overall, the aggregate effects of these activities will be improved water quality, sediment transfer and redistribution, fish passage, and aquatic habitat, and restored natural character of the watershed. NMFS anticipates that over time the beneficial effects of these efforts will manifest into improvements in population abundance, productivity, and resilience of the population.

The Program is linked directly to water withdrawals in the Carmel River (Section 2.6.3) during the dry season. As referenced in Section 2.4.3, on December 8, 2018, NMFS completed a formal section 7 consultation on its action of entering into a MOA among CAW, NMFS, and the California State Coastal Conservancy. The Parties entered this MOA to further the conservation and recovery of S-CCC steelhead. The MOA includes an agreed upon set of activities for CAW to operate under for the next six years (2017 to 2023). These activities reduce impacts to steelhead while CAW undertakes actions to eliminate their unauthorized diversions from the Carmel River, with the goal of terminating all unauthorized diversions from the river by December 31, 2021. As water withdrawals decrease, dry-back in the lower river is also expected to decrease and in turn the number of steelhead needing to be rescued will also decrease.

2.7.1 Summary of Effects on the Survival and Recovery of Steelhead

NMFS anticipates that adverse effects on steelhead from the Program would be the death of a small percentage of steelhead from rescue and transport operations or death of a larger percentage of steelhead at the Facility by either disease, starvation, or cannibalism. Without the District's rescuing and rearing of some Carmel River steelhead during the dry season, the Carmel population of S-CCC steelhead would be even more depressed than currently. During critically dry years the river starts to dry back before smolts and adults (kelts) have emigrated from the system. None of these steelhead would survive their return journey to the ocean without the trap and transport operation by the District. During the dry season when water withdrawals dewater the lower reaches of the mainstem and the tributaries, because of the Program, more steelhead in the lower reaches survive. While some individual steelhead are likely to die directly or later from injuries incurred during collection or transport, all of the steelhead in these reaches, if not rescued, would have died from a lack of water. The maximum amount of juvenile steelhead likely to be encountered in one year is 105,300. The number surpasses the maximum amount of juvenile steelhead ever rescued in 2008 (83,919), which had high adult returns. The number is greater because fluctuating conditions in the river and ocean over the past 26 years suggest that in some years the numbers of juvenile in the lower reaches could be much higher than what has been previously rescued, even twice the capacity of the Facility. It is natural for populations to have variability, especially with favorable ocean conditions and a mild winter, therefore, it is probable that as many as 105,300 steelhead would need to be rescued in one year, which is 20 percent more than the 83,919 steelhead rescued in 2008. If injury and mortality rates reach maximum levels (5 percent of steelhead rescued/transported), annually up to 5,265 juvenile steelhead are expected to be killed as a result of injury or mortality. The steelhead that are being rescued are stressed from degrading environmental conditions. In some years when the dryback starts in the spring, a high percentage of the rescued steelhead are fry. If most of the juvenile steelhead being rescued are fry, then the 5 percent mortality rate might be met but the District's average mortality rate from rescue and transport operations over the last 23 years is 0.61 percent, so likely much fewer steelhead will be killed. Fry are a very fragile and easily killed (Quinn 2005) and thus are most likely to die from rescue operations.

NMFS estimates the maximum amount of smolts likely to be rescued in one year is 5,400. As explained above for juvenile steelhead, this number accounts for years when a very successful adult spawning season is accompanied with early dewatering. If injury and mortality rates reach maximum levels (5 percent of steelhead rescued/transported), annually up to 270 smolts are expected to be killed as a result of injury or mortality. But based on the District's past history this number will be much lower. Adults and kelts are rarely encountered and when they are it is in in the critically dry years in the box trap, nevertheless, it is anticipated that a maximum of 10 steelhead (non-resident) adults would be rescued and transported and that none are expected to die during the rescue effort, and 90 kelts would be rescued and released in the lagoon or ocean and likely 5 of them would die during the rescue effort. Five kelts may die because they are physically drained and any additional stress may kill them, however, since 2006, when data was more routinely reported, the District has never reported any kelt deaths.

The Facility is unique in that most fish are reared in a flow-through channel with pool and riffle segments that are filled with cobble and wood. The intent of this design is to create an enriched artificial rearing habitat, but is instead, leading to increased rates of cannibalism, increased aggression, uneven distribution of food, higher densities and doesn't allow for the re-sorting of steelhead by size. Furthermore, the structure in the channel doesn't allow for the rearing channel to be cleaned until all the fish are removed.

The survival rates at the facility have been increasing in recent years and with the water upgrades we believe these trends will continue but since the upgrades have not been tested we must assume that the average historical survival rate (55%) will continue over the next five years. To help improve the survival rates for steelhead, stocking densities have been lowered by the removal of the filter boxes from the rearing channel, creating more space. Structure (wood and cobble) is also being removed from some of the rearing bays, effectively reducing the aggression, competition, and territoriality observed in the past. The District has also changed their feeding regimen to a spatially randomized distribution of food, which will prevent steelhead from establishing territories around regular feeding areas. As a secondary effect, the removal of structure and the randomization of food will reduce cannibalism, which, as noted above, is both a cause and effect of uneven food distribution and variation in fish size. NMFS expects these practices to minimize any potential impacts to life history expression or population genetics and decrease the potential for short-term captive rearing to alter wild phenotypes. In addition, ongoing research conducted by the SWFSC, investigating population genetics of Carmel River steelhead, will enable NMFS and the District to better address these concerns and directly speak to the efficacy of this unique facility.

A maximum of 51,585 steelhead can be reared in the Facility at one time. The average survival rates at the facility since 1996 is 54.2 percent, if we assume this survival rate would continue for the next 5 years, potentially 23,236 steelhead could die either at the Facility or when released from the Facility. None of the steelhead reared at the Facility would have survived if they were not rescued from the dewatering reaches or tributaries. And while ~55% percent survival should not be the goal of a rearing facility or hatchery, it likely exceeds the survival rate of steelhead rearing in the river. Survival rates of juvenile steelhead are very low in the wild (30-60%) and depend on many variables (Grantham 2012, Harvey 2005, Tatara 2009, Satterthwaite et al. 2009, Obedzinski 2018, May and Lee 2004).

Based on NMFS' assumption that there is enough habitat to support any translocated steelhead and the perennial rearing steelhead, it is unlikely that steelhead rearing in the perennial reaches of the river would be negatively impacted from the Program. Steelhead will likely only be moved upstream when the capacity of the Facility has been met or if it cannot operate because of some mechanical issue. In addition, NMFS and the District will take into account the densities from the fall population surveys, redd surveys, and water year type before deciding that any steelhead should be translocated to that habitat. In the past 23 years the capacity of the Facility has been exceeded only twice. If new research suggest that translocating steelhead to the perennially wet habitat is adversely affecting the translocated steelhead or the perennially rearing steelhead then translocations will cease.

Steelhead will not be released from the Facility during normal operations until cleared by a pathologist, and during emergency situations no steelhead that appears diseased or is currently undergoing disease treatment will be released. A maximum of 150 steelhead will be sacrificed for this and other disease testing throughout Facility rearing. The loss of 150 juvenile steelhead will likely ensure that disease is not transmitted to other river rearing steelhead.

Cumulative effects that are likely to occur in the action area were discussed in section 2.6; Cumulative Effects, and included a discussion of the future effects of the Rancho Cañada Village Project, Pure Water Monterey GWR Project, and future CAW diversion reductions in accordance with State Water Board Orders. The FEIR for the Rancho Cañada Golf Course estimates that the golf course used 409.6 AF/year of water on average (1991-2004) and that the new proposed project, at a minimum, will reduce groundwater pumping by 33 AF/year (ICF International 2016). Similarly, the Pure Water Monterey GWR Project will create 3,500 AF/year of purified recycled water for recharge of the Seaside Basin, which would provide a replacement water supply for CAW and allow them to reduce diversions of equal amount from the Carmel River. Future CAW diversion reductions could occur if CAW does not meet WR 2016-0016 annual milestones from 2016 until the end of December 2021. If CAW fails to achieve a milestone by the last day of the water year, then the effective diversion limit would be reduced by 1,000 AF for the following water year. All of these projects are expected to ensure a significant degree of pumping reduction from the river which would benefit S-CCC steelhead. Water withdrawals and groundwater extractions are identified as two of the greatest threats to the S-CCC steelhead DPS population (NMFS 2013). When less water is withdrawn from the river, then there is less steelhead that need to be rescued and reared/translocated.

Regarding future climate change effects in the action area, California could be subject to higher average summer air temperatures and lower total precipitation levels. Reductions in the amount of rainfall would reduce stream flow levels in Central California Coast rivers. Estuaries may also experience changes in productivity due to changes in freshwater flows, nutrient cycling, and sediment amounts. Currently scientists find it difficult to separate climate change impacts from natural variability during short timeframes like a decade because the climate change signal is very small in such short time periods (Cox and Stephenson 2007; McClure et al. 2013). All of the activities in the proposed action and permit would only be authorized for five years before being re-evaluated, and the above effects of climate change will not be discernable from recent natural variability (which includes the potential for severe droughts and floods, as well as fires) within that timeframe. The short-term adverse effects of the activities would have completely elapsed prior to realization of the longer-term climate change effects discussed above in the status of the species. The long-term beneficial effects from rescue operations is a more robust population of steelhead. In addition, as mentioned above, the cumulative effects of alternative water source projects will improve stream flow conditions and increase the population's resiliency against climate change.

Recovery of the S-CCC DPS requires the restoration of suitable habitat conditions and characteristics for all life history stages of steelhead. The Carmel River population is considered a Core 1 population because it has produced the largest run sizes in the S-CCC steelhead DPS during years of high rainfall and run-off (Good et al. 2005; Boughton 2006; NMFS 2013). Completing critical recovery actions in Core 1 populations are the highest priorities across the S-CCC steelhead DPS to achieve recovery objectives and criteria. The Recovery Plan (NMFS 2013) lists the following critical recovery actions for the Carmel River population:

> *Develop and implement alternative off channel water supply projects to eliminate or decrease water extractions from the channel (including subsurface extractions), and implement operating criteria to ensure the pattern and magnitude of groundwater extractions and water releases from San Clemente and Los Padres Dams provide the essential habitat functions to support the life history and habitat requirements of adult and juvenile steelhead. Remove or physically modify San Clemente, Los Padres, and Old Carmel River Dams to provide steelhead natural rates of migration to upstream spawning and rearing habitats; passage of smolts and kelts downstream to the estuary and ocean; and restoration of spawning gravel recruitment to the lower mainstem. In the interim ensure provisional fish passage of both adult and juvenile O. mykiss around Los Padres, San Clemente and Old Carmel River Dams, and seasonal releases from San Clemente and Los Padres Dams to support all O. mykiss life-history phases, including adult and juvenile migration, spawning, and incubation and rearing habitats. Identify, protect, and where necessary, restore estuarine and freshwater rearing habitats (including supplemental water to the estuary, management of artificial sandbar breaching at the river's mouth, and provision of spawning gravel and large woody debris within the lower mainstem).*

While the operations of the RRMP do not address any recovery action directly, the rescue and rearing operations are helping to maintain the Carmel River steelhead population while the greatest threat to the population: water withdrawals, are being reduced and other recovery actions are being completed. The Carmel River watershed exhibits the physical and hydrological characteristics (e.g., large spatial area, perennial summer and reliable winter streamflow, stream network extending inland) necessary to sustain an independently viable population, and is critical for ensuring the viability of the DPS as a whole.

2.7.2 Summary of Effects on the Value of Critical Habitat for S-CCC Steelhead Conservation

NMFS anticipates only temporary and minor adverse effects to critical habitat from the Program. As stated in the Effects to Critical Habitat discussion (Section 2.5.2), Facility water discharges have essentially no effects on critical habitat. UV settings to treat the water will be set to target the known pathogens that have shown to be a problem at the Facility in the past. The water source for the Facility is the Carmel River, eliminating the potential for novel pathogens to be introduced to the watershed from the Program's water source. In addition, the water is being treated and monitored as according the CC-RWQCB and operates with a National Pollutant Discharge Elimination System (NPDES) waiver. NMFS believes that is highly improbable that the water discharging from the facility will negatively impact Carmel River critical habitat and its value for S-CCC steelhead conservation. The translocation of rescued fish, when it occurs, will have a minor and temporary impact on critical habitat (from crowding) in the perennial reaches that receive translocated fish, until fish in those reaches disperse to available habitat.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of S-CCC steelhead or destroy or adversely modify its designated critical habitat.

2.9 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1 Amount or Extent of Take

In the biological opinion, NMFS determined that annual incidental take is reasonably certain to occur as follows for S-CCC steelhead, all of natural origin. The incidental take will occur when steelhead incidentally die from rescue, rearing, and release operations. Rescue of steelhead and steelhead that are sacrificed for disease testing, is direct take covered under the Section 10(a)(1)(A) permit.

Annually over the next five years:

- During rescue and translocation operations 5,265 juvenile (fry, YOY, yearling) steelhead may be killed;
- During rescue and translocation operations 270 smolts may be killed;
- During rescue and translocation 5 kelts (post-spawned adults) may be killed; and
- During rearing and release operations 23,236 juvenile (fry, YOY, yearling) may be killed.

2.9.2 Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.9.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

1. Abide by all terms in the Section 10(a)(1)(A) to minimize impacts of the Program on S-CCC steelhead.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the applicant must comply with them in order to implement the RPMs (50 CFR 402.14). NMFS or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. NMFS CCO shall monitor compliance with the Section 10(a)(1)(A) permit.
2. If the District exceeds the take limits, NMFS will work with the District to develop new minimization measures.
3. The District shall provide a comprehensive annual report to NMFS each year through NMFS' Authorizations and Permits for Protected Species (APPS) site NMFS' APPS Website. The annual report for Permit 14741 should describe the permitted rescue and rearing activities, and the actual take of ESA-listed salmonids that occurred during the year.

All reports, as well as all other notifications required in the permit, shall be submitted electronically or by hard copy to the NMFS Central Coast Branch Chief:

Mandy Ingham
USGS Pacific Coast & Marine Science Center
2885 Mission Street
Santa Cruz, California 95060
831-460-7580, mandy.ingham@noaa.gov

2.10 Conservation Recommendations

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

1. The District should explore different rearing options at the Facility that would modernize their operations, including the addition more round tanks and use of circular flow in round tanks for rearing rescued steelhead until release. Modernizing the facility would likely improve survival rates.

2.11 Reinitiation of Consultation

This concludes formal consultation for Carmel River Steelhead Rescue and Rearing Program.

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

3 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

3.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the District. Other interested users could include citizens of affected areas, others interested in the conservation of the affected ESUs/DPS. Individual copies of this opinion were provided to the District.. The format and naming adheres to conventional standards for style.

3.2 Integrity

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

3.3 Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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