UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

October 10, 2024 **Refer to NMFS No:** WCRO-2024-01580

James Mazza
Chief, Regulatory Division
U.S. Department of the Army
San Francisco District, Corps of Engineers
450 Golden Gate Avenue, 4th Floor
San Francisco, California 94102-3404

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Monterey Peninsula Water Management District Stream Maintenance and Restoration Program (Corps File No. SPN 1999-244600)

Dear Mr. Mazza:

Thank you for your letter of June 13, 2024, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Monterey Peninsula Water Management District (MPWMD) Stream Maintenance and Restoration Program under Section 404 of the Clean Water Act of 1973, as amended (33 USC Section 1344 et seq.) and Section 10 of the Rivers and Harbors Act (RHA) of 1899, as amended (33 U.S.C. § 403 et seq.). The enclosed programmatic biological opinion is based on the proposed project and describes NMFS' analysis of the effects of the implementation of the project on threatened South-Central California Coast (S-CCC) steelhead (*Oncorhynchus mykiss*) and their designated critical habitat.

In the enclosed programmatic biological opinion, NMFS concludes the project is not likely to jeopardize the continued existence of the S-CCC steelhead Distinct Population Segment (DPS); nor is it likely to adversely modify critical habitat. However, NMFS anticipates take of S-CCC steelhead as a result of the project and, therefore, an incidental take statement with non-discretionary terms and conditions is included with the enclosed programmatic biological opinion.

Thank you also for your request for essential fish habitat (EFH) consultation. NMFS reviewed the proposed action for potential effects on EFH pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation. We have concluded that the action would adversely affect EFH designated under the Pacific Coast Groundfish Fishery Management Plan. However, the project contains adequate measures to avoid, minimize, mitigate, or otherwise offset the adverse effects to EFH. Therefore, NMFS has no EFH Conservation Recommendations to provide.

Please contact Yvette Redler at 916-539-7066, or yvette.redler-medina@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator for
California Coastal Office

Enclosure

cc: Gregory Brown, Corps, San Francisco, CA
Thomas Christenson, MPWMD, Monterey, CA
Copy to ARN: 151422WCR2024SR00069

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

MPWMD's Stream Maintenance and Restoration Program

NMFS Consultation Number: WCRO-2024-01580

Action Agency: United States Army Corps of Engineers

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	If likely to adversely affect, Is Action Likely to Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	If likely to adversely affect, is Action Likely to Destroy or Adversely Modify Critical Habitat?
South-Central California Coast Steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	Yes	No

Fishery Management Plan that Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Groundfish and Coastal Pelagic Species Fishery Management Plans	Yes	No

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

Issued By:

Alecia Van Atta
West Coast Region
National Marine Fisheries Service

Date: October 10, 2024

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1. INTRODUCTION

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

1.1 Background

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

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

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

1.2 Consultation History

On May 2, 2024, NMFS met with the Monterey Peninsula Water Management District (MPWMD) to discuss the upcoming stream maintenance activities for the Carmel River. We discussed reinitiation of formal consultation in order to prepare a programmatic biological opinion (PBO) to cover stream maintenance and restoration activities for five years. MPWMD committed to send pertinent documents to us and the Corps in order to officially request consultation. Between May 2 and May 29, 2024, MPWMD sent multiple documents in lieu of a biological assessment including: Revised Project Description (MPWMD 2003), Project Description for Renewal of RGP 24460S (MPWD 2010), Guidelines for Vegetation Management and Removal of Deleterious Materials for the Carmel River Riparian Corridor (hereafter abbreviated as "Guidelines for Vegetation Management") (MPWMD 2012), Carmel River Watershed Assessment and Action Plan (MPWMD 2016), and MPWMD 2023 Mitigation Report (MPWMD 2024). These documents along with supplemental information and the expired NMFS PBO "Carmel River Restoration and Maintenance Project" (NMFS 2018; WCR-2018-10492) provided the necessary information for consultation. On June 13, 2024, we received a request from the Corps to initiate formal consultation for the renewal of the RGP on the Carmel River Stream Maintenance Program (SMP). On June 17, 2024, by phone conversation with MPWMD, NMFS requested additional information related to: channel restoration, levee removal, placement of large woody debris or boulder groups and culling of non-native fish. On July 18, 2024, MPWMD provided additional information by email; NMFS initiated consultation that day.

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on May 6, 2024 (89 Fed. Reg. 24268). We are applying the updated regulations to this consultation. The 2024 regulatory changes, like those from 2019, were intended to improve and clarify the consultation process, and, with one exception from 2024 (offsetting reasonable and prudent measures), were not intended to result in changes to the Services' existing practice in implementing section 7(a)(2) of the Act. 89 Fed. Reg. at 24268; 84 Fed. Reg. at 45015. We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this biological opinion and incidental take statement would not have been any different under the 2019 regulations or pre-2019 regulations.

1.3 Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies (see 50 CFR 402.02).

Under the MSA, "federal action" means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a federal agency (see 50 CFR 600.910).

The United States Army Corps of Engineers (Corps) proposes to authorize a Regional General Permit (RGP) pursuant to section 404 of the Clean Water Act for MPWMD to conduct bank stabilization, large wood and riparian vegetation maintenance, revegetation mitigation, and fisheries enhancement projects (hereafter referred to as "MPWMD's Stream Maintenance and Restoration Program" or "Program" within the lower 18.6 miles of the Carmel River from the Carmel River lagoon at River Mile (RM) 0 (measured from the ocean) to RM 18.6, (former site of San Clemente Dam). In addition, MPWMD may choose to sponsor some private landowner activities under their Program. This programmatic biological opinion (PBO) considers the effects of the Program activities over 5 years (2024-2028). This PBO does not authorize activities implemented during an emergency situation (e.g., flood). Rather, section 7 consultation for emergency activities should be completed using expedited emergency consultation procedures (50 CFR 402.05, USFWS and NMFS 1998).

The objectives of the Program are to restore and maintain bank stability and channel meanders in unstable areas, prevent resource (i.e. habitat and water) degradation, and to reestablish or enhance riparian habitat. The intent of the Program is to streamline the permit process for MPWMD and private landowners (authorized by MPWMD) interested in advancing the Program objectives through following types of maintenance and fisheries enhancement projects:

Maintenance Activities:

- installing bank stabilization erosion protection in unstable, degraded areas;
- limited removal of vegetation and woody debris from the active channel;
- maintenance or repairs of previously authorized restoration projects (e.g., completed bank stabilization projects, revegetation, and wood installation); and
- channel restoration in unstable areas.

Restoration and Fisheries Habitat Enhancement Activities:

- enhancement of riparian vegetation along stream banks and adjacent areas;

- placement of large woody debris (LWD) and boulder groups; and
- supplementing or adding cobble and spawning gravels.

Table 1 below summarizes the program work limits by activity. For MPWMD sponsored projects, MPWMD will be responsible for planning, design, environmental review, securing permits, construction management, restoration planting, irrigation system installation, monitoring, and project maintenance.

In addition to MPWMD sponsored restoration projects, MPWMD would also act as an agent on behalf of the Corps for other public and privately sponsored projects that qualify for authorization under the Permit. MPWMD would assume the responsibility for screening applicants, conducting pre-project evaluations, and inspecting project sites before and after completion to ensure compliance with criteria outlined in the Permit. MPWMD will enter into an agreement with each party proposing to do work in order to ensure compliance with Corps 404 permit conditions and the MPWMD standards.

Table 1. Program work limits.

Activity	**Annual Limit**	**5-year Program Limit**
Bank stabilization	1,200 linear feet (lf)/0.23 miles	2,400 lf/0.46 miles
Use of rip-rap/hardscape in bank stabilization projects	240 lf/0.05 miles[1]	480 lf/0.09
Vegetation clearing/woody debris management	15,840 lf/3 miles	79,200 lf/15 miles
Fisheries enhancement	program limit only	2000 lf/0.38 miles

Additionally, active work sites will not be within 1,000 feet of each other. For any project requiring dewatering, no more than 600 lf of the river will be dewatered at any one time and for no more than 60 days. All active construction will occur between the work window of July 1-October 31. Additional measures that will be implemented for each activity are detailed below and include restrictions on construction techniques, and best management practices.

1.3.1 **Maintenance Activities**

1.3.1.1 Bank Stabilization

Under the PBO, MPWMD will implement or authorize installation of slope erosion protection in areas degraded by scour and lack of vegetation to aid recovery of the riparian ecosystem. Slope protection will be installed along unstable and degraded banks that have eroded and are causing sediment input into the river or in areas where additional bank erosion would threaten structures along the riverbank. The majority of these sites are located on the outside of meander bends or in

[1] The total amount of hardscape installed will not exceed 20 percent of the maximum annual and the maximum 5-year cumulative slope protection

areas where bank vegetation has eroded (Figure 1). All methods and project designs will be provided to NMFS for concurrence prior to project implementation. Bank stabilization projects will incorporate "soft" bioengineering techniques as the first choice of construction methods. The "soft" bioengineering methods and material must make up at least 80% of the maximum annual 1,200 linear feet of bank stabilization. Annually projects cannot be within 1,000 linear feet of each other. Live plant material, logs, boulders and rootwads will be incorporated to provide shelter and cover for juveniles as well as substrate for macroinvertebrates. These projects are expected to occur infrequently and will likely be associated with erosion that may occur due to flooding/large river flows.

Figure 1. Example of conditions where bank stabilization may be installed along the Carmel River.

Erosion protection installed on slopes will be biodegradable geotextiles, live plant material, logs, rootwads, or other "soft" types of erosion protection. At the outside of bends and in critical erosion areas, a combination of erosion-resistant materials, log deflectors, rock slope protection (RSP), and vegetation will be installed to provide bank protection in case of high flows. RSP will be used in the slope protection when bioengineering methods cannot provide adequate protection to infrastructure. The total amount of RSP, or other hardscape materials that will be installed will not exceed 20 percent of the maximum annual and the maximum 5-year cumulative slope protection (1). Very large angular rock will be used to reduce the chance of RSP movement. Where feasible, the RSP will be designed with "hard points" and rock groins will be placed strategically in noncontiguous sections. When possible, large wood will be incorporated into the RSP. The RSP will be terraced if there is sufficient channel width, and trees will be planted on the terraces. Willow cuttings will be staked through the RSP into the bank beneath. Soil will be imbedded into the interstitial spaces above ordinary high-water mark (OHWM) and planted with riparian vegetation. An underlay of gravel, biodegradable filter fabric, or matting will be used when appropriate.

Prior to the start of channel grading work, salvageable (live) vegetation along the project reach will be removed with mechanized equipment and replanted at a later time within the project site. In cases where the river bank is being severely undercut or eroded, the toe of the bank may be stabilized by excavation of a toe trench, up to several feet deep below the adjacent channel bottom, and then backfilled. Material excavated from trenches will be temporarily placed on the stream banks, unless it is not feasible.

Temporary fill may be required to allow equipment into the work area. Additional, excavation activities may include the use of heavy construction equipment to dig planting holes for trees and to trench irrigation lines. Grading of the river banks may be required to recontour or reduce the slope of the existing bank to 2:1 or flatter. An exception would be for the protection of public or private infrastructure that is within 25 ft of the active channel.[2] In this case, the graded slopes may be steeper, such as a 1.5:1. Fill material will match, as closely as possible, the grain size distribution found within the project area. To help prevent a cycle of erode/stabilize, when possible, the installation of large wood structures, creation of floodplain terraces or other similar methods will be used to slow and prevent degradation.

1.3.1.2 Vegetation and Woody Debris Management

Since 1990, MPWMD has carried out annual channel projects along portions of the Carmel River to reduce the potential for bank erosion and to maintain channel capacity. Vegetation growth and sediment deposits trapped by vegetation decrease hydraulic capacity of the river channel and may cause debris jams that redirect river flow increasing the potential for bank erosion and damage to public infrastructure. MPWMD has found that removal and trimming of minor amounts of vegetation can prevent large erosion events and reduce the need for bank hardening (Figure 2). In addition, management activities include trash and inorganic debris removal.

[2] The active channel refers to the lowest portion of the mainstem channel that is occupied by flows of between the 1.5-year and 3.0-year return frequency. Generally, for the Carmel River, this is the area within the bottom of the channel that is inundated by four to eight feet (vertically) of flow. This corresponds roughly with the Corps' wetlands jurisdictional limit.

Figure 2. Example of vegetation management where downed alder and cottonwood trees will be cut in multiple sections (blue lines) and left in place for large wood habitat.

MPWMD may modify or remove vegetation and wood debris from the channel bottom under a limited set of circumstances. The amount of in-channel vegetation removal/trimming will be minimized to only what is necessary, as determined by MPWMD, to reduce erosion and potential bank failure. In areas that have private or public infrastructure that could be threatened by bank erosion, 30 feet of open channel width is desired to pass debris. Based on field surveys and observations, the 30 feet channel width allows most fallen trees and debris pile rafts to work their way through the system, without lodging sideways and potentially diverting flow. NMFS will review the annual work plan and give concurrence prior to implementation of management activities. These activities would follow the District's "Guidelines for Vegetation Management" (2012). The figures below (Figure 3-Figure 5) outline the decision process that MPWMD uses when deciding to modify any wood or vegetation. MPWMD recognizes the value of large wood to habitat functions and makes modifications that preserve the majority of these functions (MPWMD 2012).

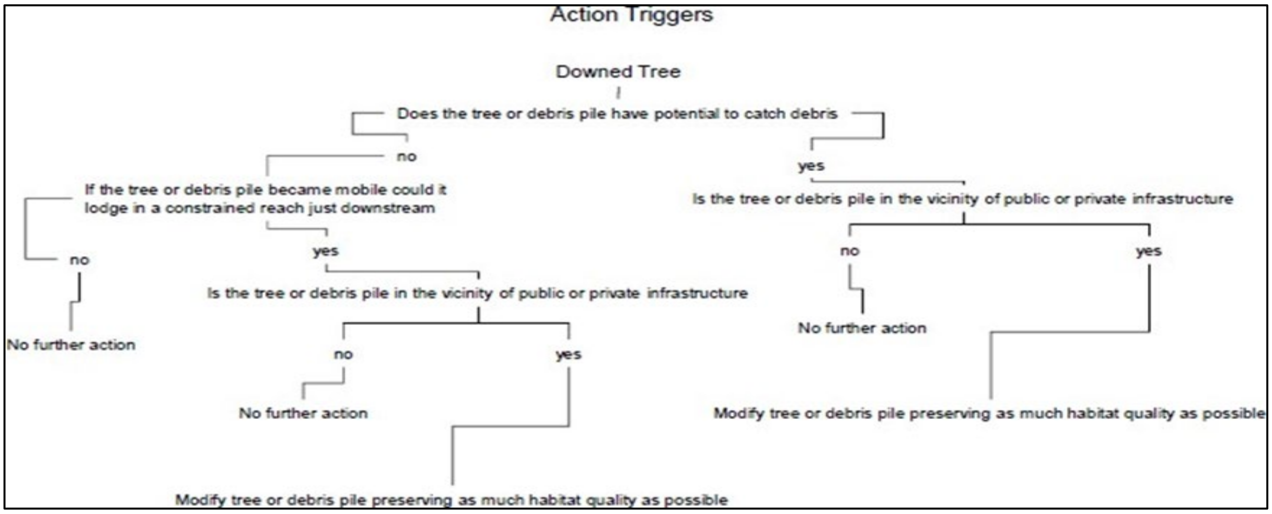

Figure 3. MPWMD's Decision Process for downed trees, taken from "Guidelines for Vegetation Management" (MPWMD 2012)

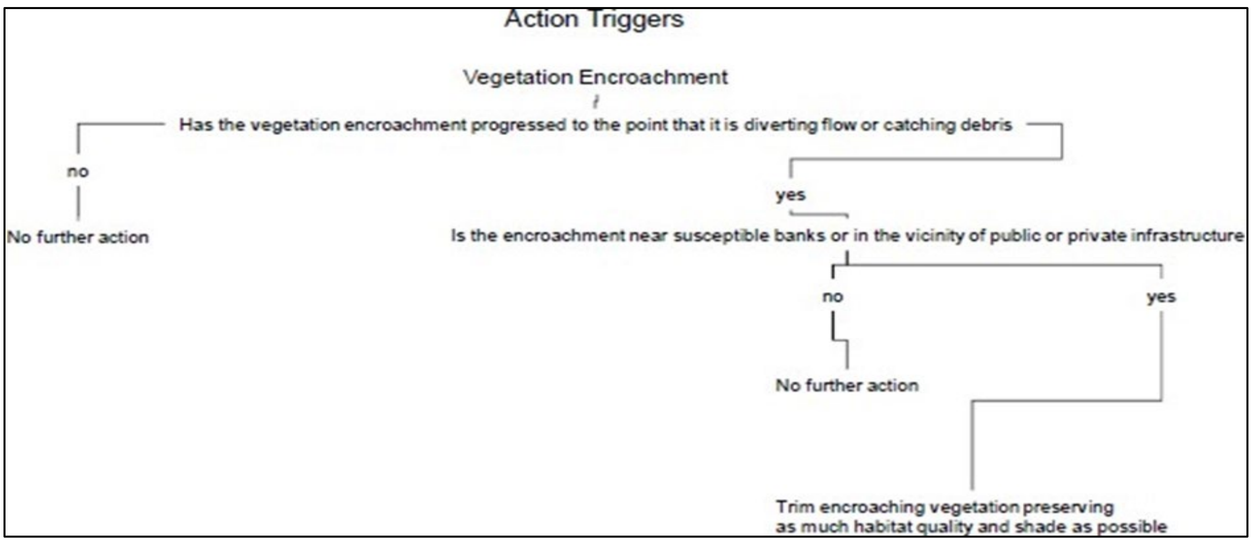

Figure 4. MPWMD's Decision Process for vegetation encroachment, taken from "Guidelines for Vegetation Management" (MPWMD 2012)

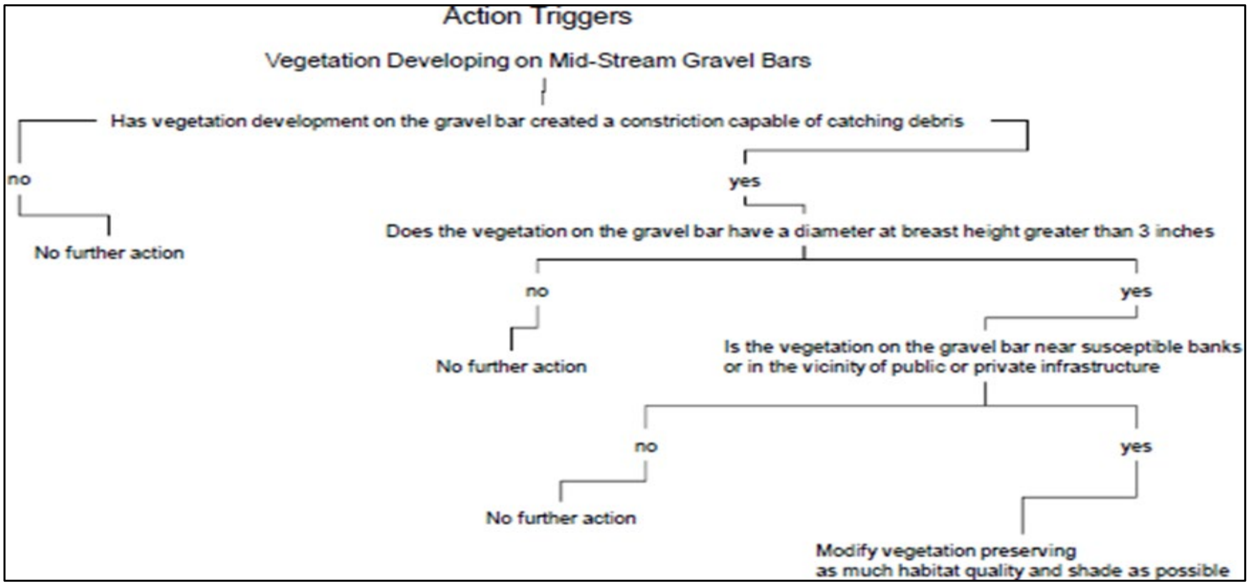

Figure 5. MPWMD's Decision Process for vegetation on mid-stream gravel bars taken from "Guidelines for Vegetation Management" (MPWMD 2012)

Streamside plants growing on adjacent riverbanks would not be affected. Vegetation cutting will be done by hand crews using hand tools and handheld power tools. No more than 50 contiguous feet of stream shade will be removed. Heavy equipment used to remove saplings and rootwads for salvage/replanting will operate only in the dry channel bed or from the bank. Compaction will be minimized by using equipment that either has (relative to other equipment available) less pressure per square inch on the ground or a greater reach, thus resulting in less compaction or less area overall compacted or disturbed.

Some cut vegetation will be chipped on the terraces above the riverbank or utilized in MPWMD's bank stabilization projects. All large wood (defined here as four inches or greater in diameter or three feet or longer in length) will remain in the river system, unless it poses a significant threat to infrastructure (i.e. houses, roads, bridges, well, pipelines and stream gages) or bank stability (Figure 3). Large wood may be notched at 20 to 25-foot intervals or otherwise modified to reduce the potential threat. When notching large wood, the core 30 percent of the diameter of the tree or six inches, whichever is greater, will remain unnotched. In some cases when large wood is lodged on bridge piers or a downed tree is fully across the river, multiple full cuts may be carried out.

1.3.1.3 Maintenance of Projects Previously Authorized under the RGP

Maintenance is occasionally needed for prior bank stabilization and fisheries habitat enhancement activities (see below). Maintenance normally includes irrigation operation and repair, weed removal, and installation of supplemental plantings. For MPWMD-sponsored projects, there is normally a 10-year agreement with landowners to perform this type of activity. For privately-sponsored projects, it will be maintained for a three-year period, which is a generally accepted period for plant establishment. If the maintenance work required is within the original project footprint and consistent with the materials, design, and construction methods of the original project, it will be considered maintenance and not count towards the annual and cumulative project limits of the PBO. However, if the maintenance work extends beyond the original project footprint, or entails new methods, materials, or designs, it will be considered a new project and count towards the annual and cumulative project limits of the PBO.

1.3.1.4 Channel Restoration in Unstable Areas

Channel restoration projects in unstable areas may include a design floodplain that is intended to flood during frequent events and recruit riparian vegetation. With large projects, a low flow channel may be left in an appropriate orientation for winter flows and the natural formation of gravel bars. Large projects using heavy equipment will have a detailed description and design submitted with the annual plan. This will include revegetation of vulnerable streambanks with native riparian vegetation. It can also include the installation of irrigation systems to promote recovery of a degraded riparian corridor. More technical restoration and bank stabilization projects may include revegetated rip rap with large wood such as cribwalls and rootwads.

1.3.2 **Restoration and Fisheries Enhancement Activities**

The Fisheries Enhancement Activities are restoration projects that are not associated with any of the maintenance bank stabilization activities described above. The goals of these actions are to reduce the potential for bank erosion and increase the quantity and quality of rearing and spawning habitat. A cumulative maximum of 2,000 feet over 5 years of Fisheries Enhancement Activities will be covered under the PBO. Annually projects cannot be within 1,000 linear feet of each other and are subject to the dewatering limit of 600 lf per dewatered area. Projects may include placement of log and boulder groups, spawning gravel augmentation (see below), and/or revegetation of riparian habitat (see above) along the banks of the river. All methods and project designs will be provided to NMFS for approval prior to project implementation and will be generally consistent with the methods in NOAA Fisheries Restoration Center's Central California Coast Restoration Project Programmatic Biological Opinion (NMFS 2015).

1.3.2.1 Riparian Vegetation Restoration along Stream Banks

All bank stabilization and restoration or enhancement projects that disturb vegetation will be revegetated with native plant species. Project designs and access points will be designed to minimize riparian disturbance and not increase the risk of channel instability. All native trees and brush will be retained as feasible, particularly ones that produce shade and/or stabilize banks.

A ratio of 3 plantings to 1 removed plant (3:1 ratio) will be used for trees over 3 inches in diameter. The species used to revegetate will be specific to the project vicinity and comprise a diverse community. Banks and low floodplain terraces will be revegetated with willow, cottonwood, sycamore, box elder, elderberry, and other native riparian species. Special emphasis will be placed on revegetation with plant species that are appropriate for the restored bank or terrace elevation and moisture condition. The integration of topsoil into the slope assists in the retention of moisture and provides a nutrient-rich medium for root development. Revegetation and irrigation will also occur in areas impacted by well water withdrawals. These efforts will occur throughout the riparian corridor along stream banks, in floodplain areas, and occasionally in terrace areas. Plantings will include many of the woody riparian species found in the Carmel River drainage and several understory species.

At revegetation sites, if needed, an irrigation system will be installed, operated, and maintained for a minimum of three years. Coring for revegetation will help to decompact soils. Weed removal would continue for a minimum of three years. The standard for success will be 70 percent survival of plantings after a period of 3 years. Broadcast planting of seed will be used to improve the chances of achieving a 70 percent ground cover after a period of 3 years. All sites will be monitored yearly in spring or fall months for three years. If there is not 70 percent survival after 3 years, all plants that have died will be replaced during the next planting cycle (generally the fall or early spring) and monitored for a period of 3 years after planting. MPWMD would continue to replant revegetation areas until they achieve a 70 percent success rate. If chemical fertilizers are applied, fertilizer will not enter the hydrologic network and will not be carried by runoff into the hydrologic network. Herbicides will not be applied in the project area, except at MPWMD's irrigation sites to control poison oak and non-native invasive species. Only the use of Rodeo© or a technical grade of glyphosphate (without surfactant) will be allowed.

1.3.2.2 Placement of Large Woody Debris (LWD) and Boulder Groups

Two large woody debris projects have been carried out along the Carmel River by the MPWMD. They included the placement of 5 anchored redwood logs at DeDampierre Park in 2002 and a rootwad and boulder group bank stabilization project at Rancho San Carlos in 2018 (Figures 6 and 7). Large woody debris projects are typically placed in parks or wide-open channel areas to improve steelhead habitat and create channel complexity. Installation techniques include anchoring large woody debris to boulders with cables. The boulders are typically buried below grade leaving mostly the large wood exposed. The area is also heavily revegetated with native riparian vegetation.

Figure 6. Rancho San Carlos prior to a bank stabilization/fisheries enhancement project that placed large wood/boulder groups. Source: MPWMD 2018

Figure 7. Rancho San Carlos bank stabilization/fisheries enhancement project after 5 years. Source: MPWMD 2023

1.3.2.3 Supplementing/Adding Spawning Gravel.

Spawning gravels may be placed at various locations within the 18-mile program reach. The gravels will be delivered to the channel by dump trucks and unloaded along the streambank. During high flows the gravel will distribute downstream. This is intended to result in the re-establishment of substrate suitable for spawning and macroinvertebrates. The gravel will be clean, river-run, round and sized between 1.5 to 4.0-inches. Likely, the gravel will consist of 60 percent 1.5 inch and 40 percent 2 to 4-inch material but may vary over the years depending on the Carmel River gravel composition. The gravel must come from an approved supplier. A MPWMD biologist will inspect all materials to ensure conformance with these specifications. All methods and plans will be approved by NMFS prior to implementation.

1.3.2.4 Dewatering for Maintenance or Restoration Activities

Some of the maintenance or restoration and enhancement activities may require dewatering so work can be done in the dry to avoid direct contact with aquatic species. If the channel within a work site is conveying flow or ponding water during a proposed activity, the site may need to be dewatered. The dewatering method selected will aim to minimize harassment, entrapment, stranding, and mortality risks to steelhead. During construction activities, no more than 600 linear feet of the river may be dewatered simultaneously. Each area will be dewatered for a maximum of 60 days. If the area has vegetation that has not been removed for access and that would be at risk of dying because of the lack of water, the area will be irrigated for the duration of the dewatering activities. All dewatering plans will be submitted to NMFS for review and concurrence prior to implementation and occur within the construction work window.

One method that may be used is a combination of a cofferdam, pump station, and re-routing pipeline. The cofferdam will be inflated or made from sandbags with native sand/gravel. The rates of bypassed stream flows will be consistent with natural stream flows immediately upstream of the work sites. Pump intake lines will be protected with screens meeting NMFS and CDFW criteria to prevent the entrainment of aquatic species. The bypass flows will be released back into the channel near the downstream end of the project area. Silt bags will be used at the end of the diversion pipe to reduce any sediment discharge downstream, dissipate flow velocity, and prevent scour at the discharge site. Alternatively, streamflow may be funneled into a pipe that also facilitates steelhead movements. The pipe would contain baffles and should be kept out of direct sunlight.

Creation of a temporary diversion channel may also be used to dewater a work site. A diversion channel would be used in situations when it is necessary to divert flow in a wide area, and has sand/cobble substrate. This technique would maintain more natural conditions (water temperatures and substrate) than a pipe. Temporary diversion channels would not be used in potential spawning areas where excavation of a trench could alter spawning gravels or impact redds. A temporary diversion channel will be excavated in a dry portion of the channel bottom across the stream channel from the work site or a sufficient distance (laterally) away from the work site in the middle section of the stream channel. Stream flow would then be blocked by forming a small cofferdam at the upper end of the work site on the bank adjacent to the work site using material excavated from the diversion channel (primarily sand, gravel, and cobble). The small cofferdam would be oriented in a manner to effectively divert stream flow into the diversion channel for the duration of the project. After construction is complete, the diversion berm will be removed, and the excavated channel will be returned to pre-project contours. The site will be replanted with native vegetation.

1.3.2.5 Fish Capture and Relocation

Fish will be excluded from entering work areas to be dewatered by blocking the stream channel above and below the work area with fine-meshed nets or screens. Juvenile steelhead and other species will be removed from the blocked area by electrofishing or seines/dip nets. Collected fish will be relocated away from the work site to areas upstream or downstream of the dewatered reach. If it is likely that the area surrounding the project site is already at the carrying capacity or if it is likely to become dewatered because of the low-flow season and/or because of water withdrawals, then the captured steelhead would be brought to the Sleepy Hollow Steelhead Rearing Facility. The maximum target steelhead density at relocation sites is 2 fish per foot (fpf) of stream. The fall population surveys performed by MPWMD would be used to estimate steelhead densities at potential relocation sites to identify areas that are below this density and could support relocated individuals without exceeding 2 fpf. A qualified biologist will be on-site to conduct fish collections in a manner which minimizes potential risks to steelhead. After all fish have been removed, the area will be dewatered following the protocols outlined above and the block nets will then be removed.

Electrofishing Guidelines:

The following methods will be used if fish are relocated via electrofishing:

1. All electrofishing will be conducted according to NMFS' *Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act* (NMFS 2000).

2. The backpack electro-fisher will be set as follows when capturing fish: Voltage setting on the electro-fisher will not exceed 300 volts.

	Initial	**Maximum**
Voltage	100 Volts	300 Volts
Duration	500 µs (microseconds)	5 ms (milliseconds)
Frequency	30 Hertz	30 Hertz

3. A minimum of three passes with the electro-fisher will be utilized to ensure maximum capture probability of salmonids within the area proposed for dewatering.

4. Water temperature, dissolved oxygen, and conductivity will be recorded in an electrofishing log book, along with electrofishing settings.

5. A minimum of one assistant will aid the fisheries biologist by netting stunned fish and other aquatic vertebrates.

Seining Guidelines:

The following methods will be used if fish are removed with seines:

1. A minimum of three passes with the seine will be utilized to ensure maximum capture probability of all salmonids within the area.

2. All captured fish will be released prior to each subsequent pass with the seine

3. The seine mesh will be adequately sized to ensure fish are not gilled during capture and relocation activities.

Guidelines for relocation of salmonids:

The following methods will used during relocation activities associated with either method of capture (electrofishing or seining):

1. Fish will not be overcrowded into buckets, allowing no more than 150 0+ fish) per 5-gallon bucket and fewer individuals per bucket for larger/older fish.

2. Every effort will be made not to mix 0+ salmonids with larger steelhead, or other potential predators, that may consume the smaller steelhead. There will be at least two containers that segregate young-of-year (0+) fish from larger age-classes. Place larger amphibians in the container with larger fish.

3. Salmonid predators, including other *native* fishes and amphibians, collected and relocated during electrofishing or seining activities will not be relocated so as to concentrate them in one area. Particular emphasis will be placed on avoiding relocation of predators into the salmonid relocation pools. To minimize predation of salmonids, these species will be distributed throughout the wetted portion of the stream to avoid concentrating them in one area.

4. Non-native fish that are captured during fish relocation activities will not be relocated to anadromous fish streams, or areas where they could access anadromous fish habitat.

5. All captured salmonids will be relocated to suitable habitat or the Sleepy Hollow Steelhead Rearing Facility. Captured fish will be placed into a pool, preferably with a depth of greater than two feet with available instream cover. If relocated to the facility, fish will be handled under the terms and conditions of the Rescue and Rearing Management Plan (NMFS WCRO-2019-02285).

6. All captured salmonids will be released prior to conducting a subsequent electrofishing or seining pass.

7. All captured fish will be allowed to recover from electrofishing before being returned to the stream.

8. Minimize handling of salmonids. However, when handling is necessary, always wet hands or nets prior to touching fish. Handlers will not wear insect repellants containing the chemical N,N-Diethyl-meta-toluamide (DEET).

9. Temporarily hold fish in cool, shaded, aerated water in a container with a lid/leaves. Provide aeration with a battery-powered external bubbler. Protect fish from jostling and noise and do not remove fish from this container until time of release.

10. Visually identify species and estimate year-classes of fish at time of release. Count and record the number of fish captured. Do not measure or process fish during relocation activities.

1.3.3 **Avoidance and Minimization Measures**

In order to minimize and avoid impacts to steelhead, all projects will adhere to the following avoidance and minimization measures (AMMs) in addition to the conservation measures discussed above in the project description:

Construction Access and Temporary Stream Crossings

- Crossings will meet all current NMFS and CDFW guidelines for fish passage. That is, temporary crossings will not impede steelhead movements. Review of crossing designs by a NMFS engineer may be necessary.
- Construction impacts are confined to the absolute minimum area necessary to complete the project. The crossing will be removed and the site will be rehabilitated prior to October 31 each year, unless an extension based on unforeseen conditions has been granted by NMFS.
- Disturbed areas will be restored to pre-activity or better conditions. Where the site will be revegetated or restored, top soil will be stockpiled for redistribution on the project area.
- Flatcar bridges with pre-constructed footings will be used if they create fewer impacts than temporary culverts.

Construction-related Turbidity, Sediment, and Toxins

- Construction will be from July 1-Oct 31, to avoid eggs, alevins, smolts, and adults.
- Excavation in stream banks will be isolated so that water is prevented from entering the excavated area until the project materials are installed and erosion protection is in place.
- Effective erosion control measures will be in place at all times during construction. Construction will begin with placement of all temporary erosion controls (e.g., straw bales, straw wattles, and silt fences) downslope of project activities within the riparian area. Erosion control structures will be maintained throughout and, if needed, after construction activities.

- Sediment will be removed from sediment controls once it has reached one-third of the exposed height of the control. Whenever straw bales are used, they will be staked and dug into the ground 12 centimeters (cm). Catch basins will be maintained so that no more than 15 cm of sediment depth accumulates within traps or sumps.
- Sediment-laden water created by construction activity will be isolated from the flowing stream during construction. When construction is complete, sediment laden water shall be pumped onto a gravel bar so it is filtered before water percolates into the surrounding area. If water cannot be percolated through native sediments, then it shall be filtered to remove sediment or disposed off-site.
- A supply of erosion control materials (e.g., straw bales, straw wattles and clean straw mulch) will be kept on hand to respond to unanticipated storm events or emergencies.
- The use of end hauling will be maximized to reduce the temporary stockpiling of earth to be removed from the project site.
- Temporary stockpiling of earth during wet weather will be avoided.
- For projects occurring during wet weather, erosion control (protection or stabilization) will be used on stockpiles (all of which will be temporary and unavoidable) and exposed soils. Soils will not be left exposed overnight; exposed soils will receive final erosion protection as soon as that area will not receive further disturbance, and all areas will be stabilized within seven days of project completion or prior to forecasted rain, whichever is sooner. Movement of soil off of stock piles will be prevented by, for example, covering any temporary stockpiles with plastic sheeting or tarps; and/or installing a berm around the stockpile; and/or preventing the overland flow of water from an upslope road or hillside from contacting the stockpile; and preventing any water-carrying material from a stockpile from entering the aquatic ecosystem.
- Material removed during excavation will be placed only in locations where it cannot enter stream networks. Conservation of topsoil (removal, storage and reuse) will be employed.
- After project completion and prior to October 31 (unless an extension is approved by NMFS), all exposed soil will be stabilized, for example using erosion control seeding and mulching. Placement of erosion control blankets and mats (if applicable) will occur within seven days after project completion.
- Efforts will be made to cover exposed areas as soon as possible after exposure.
- Temporary fill will be removed in its entirety prior to October 31 of the year of activities. Unless an extension has been approved by NMFS.
- Areas for fuel storage and refueling and servicing of construction equipment and vehicles will be located in an upland location.
- All equipment that is used for in-water work will be cleaned to remove external oil, grease, dirt, and mud prior to placing the equipment in the water; wash sites will be placed so that wash water does not flow into flowing waters or wetlands; equipment will be in good condition showing no signs of leaking fuels or fluids.
- Petroleum products, chemicals, fresh cement, or deleterious materials will not be allowed to enter flowing waters.

- Water contaminated by petroleum products, chemicals, fresh cement, or deleterious materials will not be allowed to enter flowing waters.
- In the event of a spill, the permittee will stop work immediately, begin clean up, and notify the appropriate authorities.
- Spill clean-up supplies (e.g., absorbent booms when working in live streams) will be on site, and operators will know how to employ them.

1.3.4 **Administration of Project Activities**

Project activities will be implemented in a manner consistent with the following process:

1) annual workplan development and notification by June 1;
2) implementation of planned work between July 1 and October 31; and
3) annual post notification/compliance reports by February 1 of the following year.

For all bank stabilization and fisheries habitat enhancement projects, the methods and designs will be sent to NMFS for approval by April 15th. NMFS will have 45 days to review and provide comments to MPWMD and the Corps. MPWMD will include photos of the vegetation and large wood maintenance activities in their annual work plan. NMFS will send an email notification to the Corps and MPWMD when NMFS concurs that the annual work plans and project designs are consistent with this PBO. NMFS can also provide technical assistance in the earlier project planning phase.

For MPWMD projects, MPWMD will be responsible for planning, design, environmental review, securing permits, construction management, restoration planting, irrigation system installation, monitoring, and project maintenance. MPWMD will be responsible for the preparation of annual post-notification/compliance reports to be provided to NMFS.

In addition to MPWMD projects, MPWMD will also act as an agent for other public or private sponsored projects that can qualify for authorization under the Program. Applicants seeking project authorization will provide to MPWMD, a notification package containing a project description with date and duration of construction, an erosion control plan, a temporary streamflow diversion plan, description of impact minimization practices used during construction activities, a mitigation and monitoring plan, maps and the identification of listed species and life stages that may use the project area at any time. MPWMD will review the notification package for completeness, and send the notification package to the Corps and NMFS. MPWMD will assume the responsibility for screening applicants, conducting pre-project evaluations, and inspecting project sites after completion to ensure compliance. With NMFS and the Corps' approval, MPWMD will issue to each party proposing to do work a River Work Permit that requires compliance with Corps 404 permit conditions and MPWMD's standards. Ultimately, however, MPWMD will be responsible for all impacts to species and habitat resulting from all projects implemented under the Program.

MPWMD will be responsible for the preparation of annual post-notification/compliance reports to be provided to NMFS. These reports will contain information on all projects constructed under the Program for a given year; MPWMD's evaluation forms prepared for each project; and project specific information such as: a) project descriptions; b) project impacts; c) maps; d) before, during, and post-construction photographs; e) linear feet or area affected by each activity type; f) quantities and types of fill material; g) steelhead life stages that may use the project area at any time; h) information illustrating compliance with all permit conditions; i) number of relocated steelhead; and j) the number of steelhead that died from dewatering/fish relocation.

We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not.

2 Endangered Species Act: Biological Opinion And Incidental Take Statement

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

2.1 Analytical Approach

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

This biological opinion also relies on the regulatory definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02).

The designation of critical habitat for S-CCC steelhead uses the term primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The ESA Section 7 implementing regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the final rule revising the definition and adding this term (84 FR 44976, 44977; August 27, 2019), that revision does not change the scope of our analysis, and in this Opinion, we use the terms "effects" and "consequences" interchangeably.

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

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

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species likely to 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' "reproduction, numbers, or distribution" for the jeopardy analysis. The opinion also examines the condition of designated critical habitat, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated critical habitat, and discusses the function of the PBFs that are essential for the species' conservation.

2.2.1 **Species Description, Life History and Status**

This PBO 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.

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 (DO) conditions and a plentiful food supply. Fluctuating diurnal water temperatures also aid in survivability of salmonids (Busby et al. 1996).

O. mykiss exhibit a variable life history. Coastal O. mykiss populations in central and southern California are classified into three principle life history strategies: fluvial-anadromous, lagoon anadromous, and freshwater resident or non-anadromous (Boughton et al. 2007). The anadromous forms of S-CCC steelhead are classified as "winter-run" steelhead because they emigrate from the ocean to their natal streams to spawn annually during the winter; although run times can extend into spring months (April and May) (Moyle 2002). Within the S-CCC steelhead DPS, adults typically enter freshwater between December and May, with peaks occurring in January through March (Wagner 1983; Fukushima and Lesh 1998). It is during this time that streamflow quantities (depths and velocities) are suitable for adults to successfully migrate to and from spawning grounds. The minimum stream depth necessary for successful upstream migration is about 13 centimeters (cm), although short sections with depths less than 13 cm are passable (Thompson 1972). More optimal water velocities for upstream migration are in the range of 40-90 cm/s, with a maximum velocity beyond which upstream migration is not likely to occur of 240 cm/s (Thompson 1972).

Redds are generally located in areas where the hydraulic conditions limit fine sediment accumulations. Reiser and Bjornn (1979) found that gravels of 1.3-11.7 cm in diameter were preferred by steelhead. Survival of embryos is reduced when fines smaller than 6.4 millimeters (mm) comprise 20 to 25 percent of the substrate. This is because, during the incubation period, the intragravel environment must permit a constant flow of water in order to deliver dissolved oxygen to and remove metabolic wastes. Studies have shown embryo survival is higher when intragravel velocities exceed 20 cm/hr (Coble 1961; Phillips and Campbell 1961). Other intragravel parameters such as the organic material in the substrate effect the survival of eggs to fry emergence (Chapman 1988; Everest et al. 1987; Shapovalov and Taft 1954). The number of days required for steelhead eggs to hatch is inversely proportional to water temperature and varies from about 19 days at 15.6˚ degrees (°) Celsius (C) to about 80 days at 5.6˚ C. Fry typically emerge from the gravel two to three weeks after hatching (Barnhart 1986).

Once emerged from the gravel, steelhead fry rear in edgewater habitats along the stream and gradually move into pools and riffles as they grow larger. Cover, sediment, and water quality are important habitat components for juvenile steelhead. Cover in the form of woody debris, rocks, overhanging banks, and other in-water structures provide velocity refuge and a means of avoiding predation (Bjornn et al. 1991; Shirvell 1990). Steelhead tend to use riffles and other habitats not strongly associated with cover during summer rearing more often than other salmonids. In winter, juvenile steelhead become less active and hide in available cover, including gravel or woody debris. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. Water temperature can influence the metabolic rate, distribution, abundance, and swimming ability of rearing juvenile steelhead (Barnhart 1986; Bjornn and Reiser 1991; Myrick and Cech 2005). Optimal temperatures for steelhead growth range between 10 and 20° C (Hokanson et al. 1977; Myrick and Cech 2005; Wurtsbaugh and Davis 1977). Fluctuating diurnal water temperatures are also important for the survival and growth of salmonids (Busby et al. 1996).

Although variation occurs, S-CCC juvenile steelhead that exhibit an anadromous life history strategy usually rear in freshwater for 1-2 years (NMFS 2013). S-CCC steelhead smolts emigrate episodically from freshwater in late winter and spring, with peak migrations occurring in April and May (Shapovalov and Taft 1954; Fukushima and Lesh 1998; Ohms et al. 2019). Steelhead smolts in California range in size from 120 to 280 mm (fork length) (Shapovalov and Taft 1954; Barnhart 1986). Smolts migrating from the freshwater environment may temporarily utilize the estuarine habitats for saltwater acclimation and feeding prior to entering the ocean. 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).

Juvenile steelhead of the lagoon-anadromous life history rear in lagoons for extended periods (Smith 1990; Boughton et al. 2006; Hayes et al. 2008). 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). Lagoons are a specific type of estuarine habitat where a seasonal impoundment of water develops after a sandbar forms at the mouth of the watershed, temporarily separating the fresh and marine environments (Smith 1990). Like other estuary types, bar-built lagoons can serve as important rearing areas for many fish and invertebrate species—including juvenile steelhead (Simenstad et al. 1982; Smith 1990; Robinson 1993; Martin 1995). Due to the combination of high prey abundance and seasonally warmer temperatures, juvenile steelhead that rear in lagoons have been found to achieve superior growth rates relative to upstream fish of the same cohort, and can therefore disproportionally represent future adult steelhead returns (Bond et al. 2008; Hayes et al. 2008). This is especially important considering that lagoon habitats often represent a fraction of the watershed area. For the S-CCC steelhead DPS, it is hypothesized that the most limiting habitat in terms of availability is over- summer rearing habitat, including functional lagoon habitats (Boughton et al. 2006).

Status of S-CCC Steelhead DPS

Populations of S-CCC steelhead throughout the DPS have exhibited a long-term, negative trend since at least the mid-1960s when 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 more recent data indicate this trend continues (Good et al. 2005). Current S-CCC steelhead run-size estimates in the five largest systems of 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). More recent estimates for total run-size do not exist for the S-CCC steelhead DPS (Good et al. 2005; Williams et al. 2016) as few comprehensive or population monitoring programs are in place. Additional information available on anadromous run size since Williams et al. (2016) remains limited but does not appear to suggest a change in overall extinction risk, with a few notable exceptions (NMFS 2023).

Analyses conducted by the S-CCC steelhead Technical Review Team (TRT) indicate the S-CCC steelhead DPS consists of 12 discrete sub-populations representing localized groups of interbreeding individuals, and none of these sub-populations currently meet the definition of viable (Boughton et al. 2006; Boughton et al. 2007). Most of these sub-populations are characterized by low population abundance, variable or negative population growth rates, and reduced spatial structure and diversity. The Pajaro River and Salinas River populations are in particularly poor condition (relative to watershed size) and exhibit a greater lack of viability than many of the coastal subpopulations. Groundwater extraction and dam releases are primary stressors to life history and habitat requirements particularly in agricultural areas of the Salinas and Pajaro watersheds (NMFS 2013). In the Carmel River there has been a variable but consistent decline in abundance of anadromous adults (Williams et al. 2016; Boughton 2017) that appears to persist particularly after several years of drought (NMFS 2023). The decline is somewhat unexpected because it coincides with a concentrated effort to restore the habitat in the Carmel River and to improve numbers through a rescue/captive rearing operation (Williams et al. 2016). This is discussed further in the action area baseline (Section 2.4).

Although steelhead are present in most streams in the S-CCC DPS (Good et al. 2005), their populations are small, fragmented, and unstable (more subject to stochastic events) (Boughton et al. 2006). In addition, 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 the S-CCC steelhead DPS as threatened under the ESA on January 5, 2006 (January 5, 2006; 71 FR 834).

In the most recent status update (NMFS 2023), NMFS concluded there was no evidence to suggest the status of the S-CCC steelhead DPS has changed appreciably since the publication of the previous status review (Williams et al. 2016). The risk to the DPS persistence has remained essentially the same since NMFS' 2016 5-year review, though a number of projects have been undertaken that have addressed specific issues in a number of core recovery watersheds. However, major habitat concerns remain in this DPS including passage impediments, altered flow regimes, prolonged droughts and frequent wildfires exacerbated by climate change and loss of estuarine habitat, therefore, the S-CCC steelhead DPS remains listed as threatened (NMFS 2023; 84 FR 53117).

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 1,832 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 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 (Hunt and Associates Biological Consulting Services 2008), and to some degree disease and predation.

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. While individual components of this list of factors affecting steelhead and critical habitat have fluctuated in severity over the last 100 years, the general trend has been one of increasing and intractable pressure on aquatic resources. These factors have significantly altered steelhead habitat quantity and quality. 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.

In particular, the ecological effects of large dams on river systems have been well documented (Collier et al. 2000; World Commission on Dams 2000; Bednarek 2001; Duda et al. 2008; Kloehn et al. 2008; Pess et al. 2008). 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. 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. 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. Altered riverine systems are reducing habitat connectivity and complexity in most of the rivers where S-CCC steelhead DPS are present.

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. Alteration of stream flows has increased juvenile salmonid mortality for a variety of reasons including: impaired migration from insufficient flows or habitat blockages; loss of rearing habitat due to dewatering and blockage; stranding of fish resulting from rapid flow fluctuations; entrainment of juveniles into unscreened or poorly screened diversions; and increased juvenile mortality resulting from increased water temperatures (Chapman and Bjornn 1969; Berggren and Filardo 1993; 61 FR 56138). However, the greatest threats to the S-CCC steelhead DPS population are the degradation of habitats and loss of habitat by impassable dams. The SWFSC has identified re-establishing access to upper watersheds in the Pajaro and Salinas watersheds as one of the highest priorities for the recovery of the S-CCC steelhead DPS (Boughton et al. 2006; Boughton et al. 2007).

Estuarine Habitat Loss

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. Although many historically harmful practices have been halted, much of the historical damage remains to be addressed and the necessary restoration activities will likely require decades. Many of the land use activities described above have resulted in the loss of wetlands and degradation of estuaries in the larger river systems such as the Pajaro, Salinas, Carmel and Arroyo Grande rivers, and many also apply to the smaller coastal systems such as Morro, San Luis Obispo, and Pismo Creeks (NMFS 2011).

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. There are also many anecdotal reports of recreational fishing and poaching of instream adults (Franklin 2005) which suggests a relatively high level of fishing pressure. 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).

Ocean harvest of steelhead is considered to be extremely rare and is an insignificant source of mortality for this DPS since both sport and commercial harvest of steelhead in the ocean is prohibited by CDFW (CDFG 2010). Although high seas driftnet practices in the past likely resulted in incidental harvest of steelhead, the occurrence of this is thought to be limited to some local areas as steelhead are not a commercially targeted species (NMFS 2011).

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.

While some of these programs have succeeded in providing seasonal fishing opportunities, the impacts of these programs on native, naturally-reproducing steelhead stocks are not well understood. Competition, genetic introgression and disease transmission resulting from hatchery introductions could reduce the production and survival of native, naturally-reproducing steelhead (Araki et al. 2007; Araki et al. 2008; Araki et al. 2009); although, genetic research on southern California steelhead has not detected any substantial interbreeding of native steelhead with hatchery reared steelhead (Girman and Garza 2006; Garza and Clemento 2007; Clemento et al. 2008; Abadia-Cardoso et al. 2011; Christie et al. 2011). Additionally, collection of native steelhead for hatchery broodstock purposes can also harm small or dwindling natural populations. However, artificial propagation, if done to preserve individuals representing genetic resources that would otherwise be lost, or done to aid wild fish repopulation of streams, may also play an influential role in steelhead recovery. Such efforts can supplement, but are not a substitute for naturally-reproducing populations.

Environmental Factors

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. However, 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 2011). 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 2011).

Ocean Conditions

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. Beamish et al. (1997) noted decadal-scale changes in the production of Fraser River sockeye salmon that they attributed to changes in the productivity of the marine environment. They also reported the dramatic change in marine conditions occurring in 1976-77 (an El Niño year), when an oceanic warming trend began. These El Niño conditions, which occur every three to five years, negatively affect ocean productivity. For instance, Johnson (1988) noted increased adult mortality and decreased average size for Oregon Chinook salmon (*O. tshawytscha*) and coho salmon (*O. kisutch*) during the strong 1982-83 El Niño. Brood years of salmon and steelhead that were in the ocean during the 1983 El Niño event exhibited poor survival all along the Pacific coast of California (Garrison et al. 1994). Salmon populations have persisted over time, under pristine habitat conditions, through many cycles of poor ocean survival in the past. It is less certain how they will fare in periods of poor ocean survival when their freshwater, estuary, and nearshore marine habitats are degraded (Good et al. 2005).

Reduced Marine-Derived Nutrient Transport

Salmonids may play a critical role in sustaining the quality of habitats essential to the survival of their own species via the transfer of marine-derived nutrients (MDN) to freshwater systems. MDN are nutrients that accumulate in the bodies of salmonids while they are in the ocean and are then left in freshwater streams when salmonids die after spawning. Salmon carcasses decay or are eaten, transferring these nutrients from the ocean to watersheds. MDN has been shown to be vital for the growth of juvenile salmonids (Bilby et al. 1996; Bilby et al. 1998). The return of salmonids to rivers makes a significant contribution to the flora and fauna of both terrestrial and riverine ecosystems (Gresh et al. 2000).

Reduction of MDN in watersheds is a consequence of the past century of decline in salmon abundance (Gresh et al. 2000). Evidence of the role of MDN and energy in ecosystems suggests this deficit may result in an ecosystem failure contributing to the downward spiral of salmonid abundance (Bilby et al. 1996). The loss of this nutrient source may perpetuate salmonid declines in an increasing synergistic fashion.

Disease, Predation and Invasive Species

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).

Introductions of non-native aquatic species (including fishes and amphibians) and habitat modifications (e.g., reservoirs, altered flow regimes, etc.) have resulted in increased predator populations in numerous river systems, thereby increasing the level of predation experienced by native salmonids (Busby et al. 1996). Non-native species, particularly fishes and amphibians such as large and smallmouth basses and bullfrogs have been introduced and spread widely. These species can prey upon rearing juvenile steelhead (and their conspecific resident forms), compete for living space, cover, and food, and act as vectors for non-native diseases. The invasive New Zealand mudsnail (*Potamopyrgus antipodarum*) has become a problem in freshwater streams as dense populations can displace and out-compete native species, sometimes by consuming up to half the food resources in a waterway. The snails have been linked to reduced populations of aquatic insects, including mayflies, stoneflies, caddisflies, chironomids and other insect groups upon which trout and steelhead populations depend. Artificially induced summer low-flow conditions may also benefit non-native species, exacerbate spread of diseases, and permit increased avian predation.

Small populations of steelhead such as those found in the S-CCC steelhead DPS may be more vulnerable to the effects of disease and/or predation particularly in combination with the synergistic effects of other threats. In addition, the effects of disease or predation may be heightened under conditions of periodic low flows or high temperatures which are characteristic of watersheds in this DPS.

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). For this programmatic, the action area includes all river channel and banks in the Carmel River from the base of the former San Clemente Dam at RM 18.6 to the Carmel River lagoon at River Mile (RM) 0 (measured from the ocean).

Descriptions of Specific Reaches in the Carmel River that are within the Action Area.

Nine reaches located on the mainstem of the Carmel were identified in the SCD removal project (URS Corporation 2012) that possess habitat for steelhead (Figure 8). These reaches support the PBFs required for migration, spawning, and rearing. Summaries of the reaches within the action area (Reaches 4-9) are provided below, from upstream to downstream beginning with reach 4 (URS Corporation 2012).

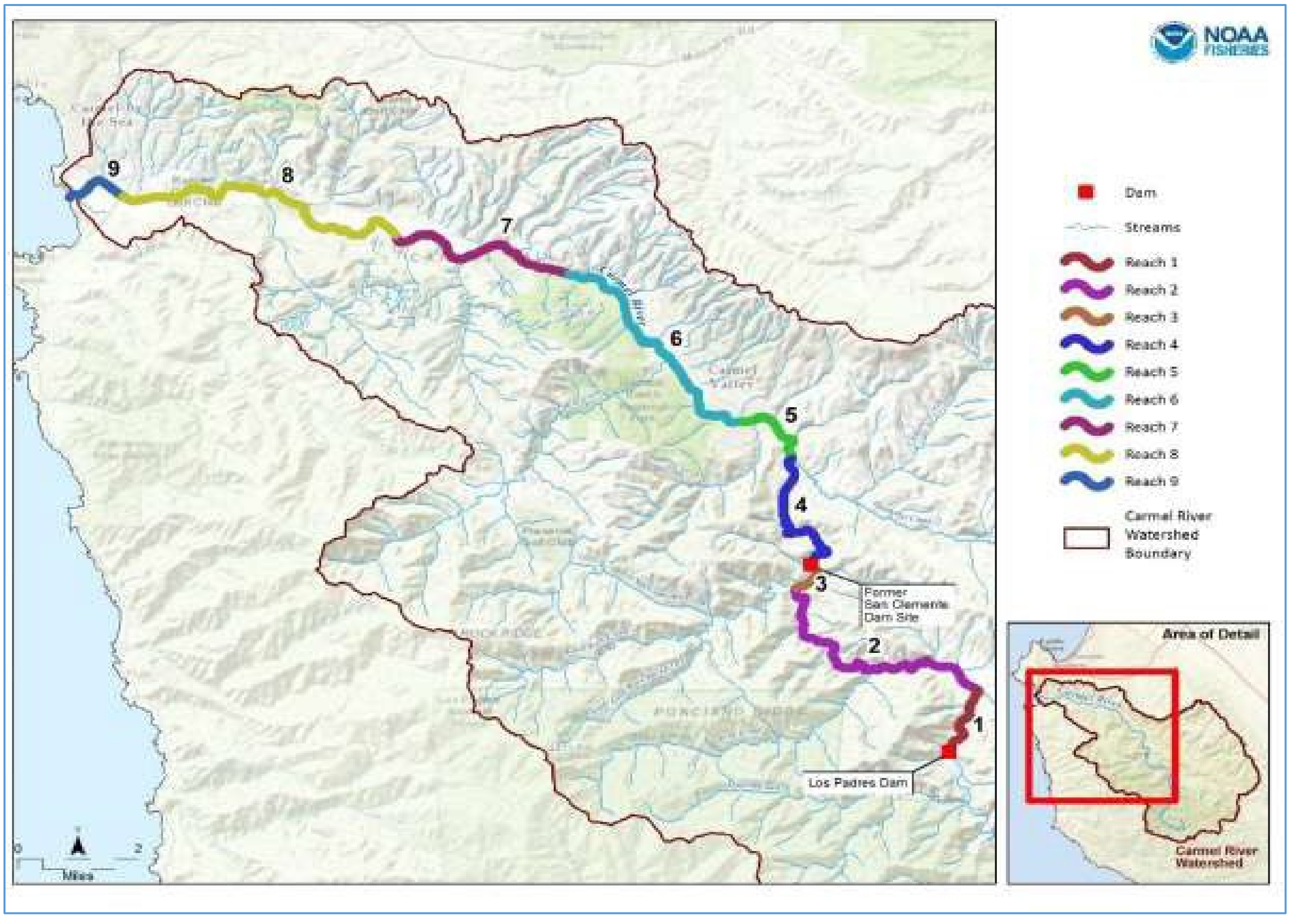

Figure 8. Los Padres Dam Reaches (1 and 3) and Action Area Reaches (4-9)

Reach 4. Reach 4 includes the three-mile portion of the Carmel River from the former SCD downstream to the Tularcitos Creek confluence. The river runs through a steep-sided, rocky canyon and has no tributaries. The substrate within the channel consists of cobble and boulders and provides habitat for rearing and migration but not for spawning. The channel within this reach is mostly devoid of gravel and sand because it was previously retained within SCD.

Reach 5. Reach 5 consists of the 1.4-mile portion of the Carmel River between the Tularcitos Creek confluence and the community of Robles del Rio. The substrate within this reach consists of cobble, gravel, and sand. This reach has a higher proportion of gravel and sand than Reach 4, as Tularcitos Creek provides a supply of finer substrates. The reach provides habitat for spawning, incubation, rearing, and migration. It includes access to two tributaries: Tularcitos and Hitchcock creeks.

Reach 6. Reach 6 includes the 4.6-mile portion of the Carmel River between Hitchcock Canyon and Randazzo Bridge, including the Las Garzas Creek tributary. This reach provides habitat for spawning, incubation, rearing, and migration. A small section of this reach may become intermittent during dry years. This reach also contains a critical riffle that is a potential barrier to fish passage during low flows.

Reach 7. Reach 7 includes the 3.4-mile portion of the Carmel River between the Randazzo Bridge and the Schulte Road Bridge, including Robinson Canyon Creek tributary. In this reach, the Carmel River is low gradient, possessing a bed of cobble, gravel, and sand. The reach provides habitat for spawning, incubation, rearing, and migration.

Reach 8. Reach 8 includes the 2.4-mile portion of the Carmel River between the Schulte Road Bridge and Highway 1. The streambed substrate consists mostly of sand and provides very limited habitat for spawning and incubation. During dry years, this reach can become completely dry. There are no barriers to migration within this reach. Potrero Creek is the main tributary to this reach.

Reach 9. Reach 9 includes the 1.1-mile section of stream channel and lagoon from downstream of Highway 1 to the mouth of the Carmel River. Within the last 5 to 10 years the channel substrate has transitioned from primarily sand to more gravel and cobble to the extent that redds have been observed in this reach (Kevan Urquhart, MPWMD, personal communication, August 2017). See below for a discussion of the Carmel River estuary/lagoon.

The Carmel Lagoon (Reach 9) 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).

2.4 Environmental Baseline

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. 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 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The impacts to listed species or designated critical habitat from federal agency activities or existing federal agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (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. The majority of the 255-square mile watershed is rural, with primary land use activities consisting of cattle ranching, limited agriculture, viticulture, recreation (golf courses and park areas), and national forest and open space. Urban development is concentrated along the riparian corridor and floodplain of the Carmel River (CRWC 2016) Although less than 4 percent of the watershed is classified as urban, well over 50 percent of the watershed is privately-owned. The lower Carmel Valley, through which the mainstem flows, is surrounded by public parks, extensive ranches and areas of rural land use. There are significant human impacts in the Carmel River basin, including, illegal water withdrawals, over appropriation of surface and groundwater, urbanization, an expansive road network, operation of the Los Padres Dam (LPD) and formerly the San Clemente Dam (SCD), mechanical sandbar breaching, and grazing and agriculture practices that cumulatively result in a degradation of habitat quality (Smith et al. 2004).

2.4.1 **Status of S-CCC Steelhead in the Carmel River Watershed**

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 Abundance Surveys

Adult migration in the Carmel typically occurs January through May, with the majority of spawning between February and March. Smolts typically migrate downstream in the spring with peaks in April and May. Smolt migration increases with river freshets, but they may move downstream during all months of the year. Kelts also migrate downstream after spawning in the late winter/early spring. Spawning can occur above and below the LPD and in several tributaries of the Carmel River. According to CDFW, the annual steelhead run prior to the construction of the dams was as much as 8,000 adults (Becker et al. 2008). Using observations from local field personnel, CDFW estimated the annual steelhead spawning population in the mainstem Carmel River to be about 1,650 fish in 1965 (Titus et al. 2009). More recent 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). Based upon adult steelhead migration counts at the former SCD and at LPD, steelhead in this watershed have undergone a steady decline.

Adult steelhead counts at SCD were discontinued in 2015 after removal of the fish ladder and dam. LPD adult fish counts were highly correlated with the counts conducted downstream at SCD and provide long-term monitoring of adult counts since S-CCC were listed in 1997 (Figure 8). During this timeframe there is an overall downward trend in steelhead adult numbers. However, many adults will not be encountered at the LPD when flows make the ladder difficult to navigate or as they spawn below and in other tributaries of the Carmel River. Redd surveys below SCD confirm that the spawning habitat in the lower river has improved considerably over the last 21 years and adults are now spawning in the lower river instead of passing the LPD fish counting station (CRWA 2016).

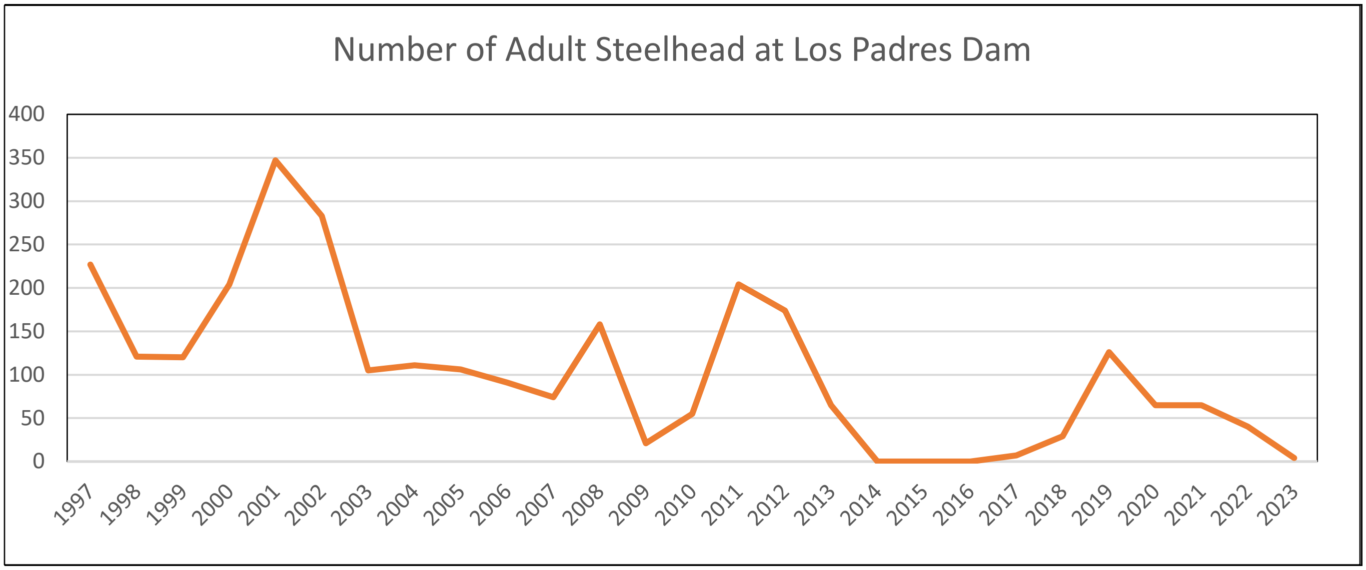

Figure 8. Adult Counts at Los Padres Dam Fish Ladder. Source: MPWMD 2023

The low adult returns in 2014-2016 were primarily due to the critically intense drought and the lack of adult access to the watershed from the sandbar not breaching to allow passage. From 2018 through 2022, there was an increase in the number of adult steelhead observed at the LPD fish counter from 7 (2017) to 126 (2019). In 2017, 2019, and 2023, abundant winter rains created good conditions for steelhead to enter the system. However, after the recent high in 2019, adult returns to the trap have declined with 65, 65, 40, 4 fish counted during 2020-2023. Improved spawning conditions in the lower Carmel River, may encourage fish to spawn before they reach 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, but tributary redd surveys are limited. There is no long-term monitoring station that can capture abundance of adults in the watershed at this time, although efforts are underway to install and operate a weir in the lower Carmel River that will help quantify adult returns to the watershed.

Similar to previous post-drought years, it is expected that steelhead numbers will rebound. However, numbers in the immediate future are likely to remain well below what would be considered recovered. With the removal of SCD, it is much easier for steelhead to access high quality spawning areas. The greater accessibility to this habitat and that above LPD will aid in the recovery of steelhead in this watershed. A recent data study on the Carmel River population suggest that during droughts, the distribution of steelhead tends to retract into the relatively reliable habitats at high elevations, where surface flow is sustained by groundwater fed seeps and springs and is less vulnerable to the heating and drying of the lower valley. These findings suggest a mechanism by which population density can become more stabilized at low abundance, through fish retracting into reliable drought refugia during periods of low-rainfall and re-expanding into less reliable downstream habitats after the drought ends (Boughton and Ohms 2021).

In addition to adult monitoring, long-term monitoring of juvenile steelhead by MPWMD at eleven sites along the mainstem Carmel River below LPD suggests that fish density continues to be quite variable between years and among sites, from less than 0.10 fish-per-foot (fpf) of stream to levels frequently above 1.00 fpf, values that are typical of well-stocked steelhead streams (Figure 10). Fish density has been improving since the last long drought of 2013-15. In the 2023 reporting period, the average population density was 0.80 fpf, slightly higher than the long-term average of 0.74 fpf for the Carmel River (MPWMD 2024).

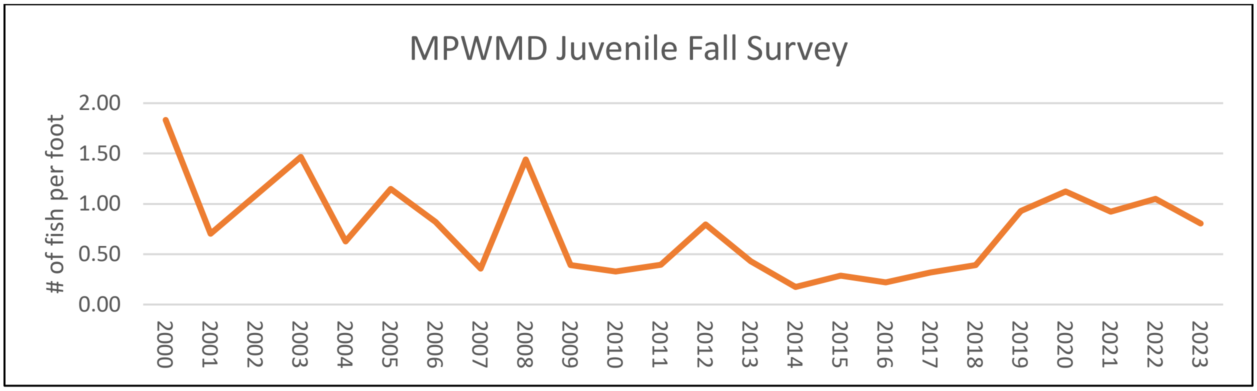

Figure 9. Mean annual juvenile steelhead density (# fish per foot) from index sites in the Carmel River. Source: MPWMD 2023

In summary, data on current adult abundances and juvenile fish densities both indicate that the 2012-2015 drought had negative impacts on the DPS. However, since the end of the drought in 2017, adult counts and juvenile densities have shown improvement, suggesting that steelhead populations have persisted in drought refugia (e.g., the upper Carmel River).

2.4.2 **Status of Critical Habitat in the Carmel River Watershed**

Several anthropogenic changes detrimental to the ecological function of critical habitat for S-CCC steelhead have occurred in the watershed. Impediments to fish passage from road crossings and dams restrict access to spawning and rearing habitat in the mainstem and tributaries of the Carmel River. Dams prevent free passage to often essential cooler water habitats that are necessary for the completion of the salmonid lifecycle in freshwaters. The ecological effects of large dams on river systems have been well documented (see section 2.2.2) and have impacted this watershed. These consequences are numerous and varied, and can include both direct and indirect impacts to the entire river ecosystem. The influence of two large dams deprived the Carmel River of its sediment load which led to erosion downstream of the river bed and banks causing channel incision or deepening of the river. With the removal of SCD, the Carmel River will become more stable but the process will take years and during this transition the river may have a greater increase in bank erosion events. Removal of the dam restores natural sediment and large wood transport dynamics between the upper and lower watershed. The dam removal is expected to allow the river to partially resume unimpaired bedload dynamics, returning the supply of gravel and coarse sands to a level closer to the pre-dam era (Boughton et al. 2016). The removal of SCD is also expected to increase the diversity of benthic macroinvertebrates (steelhead prey) throughout the lower river (Boughton et al. 2016).

Water withdrawals has adversely affected PBFs by reducing rearing habitat and increasing temperatures for over-summering steelhead juveniles. Degradation of water quality from urban and agricultural runoff that affect base flows that are critical to support rearing juvenile steelhead in the Carmel watershed, particularly in the lower and middle mainstem. Continued threat of prolonged drought, and the related frequency and magnitude of wildfires in response to climate changes present additional challenges to the existing remnant anadromous steelhead populations in the Carmel River.

In 2016, a new threat to Carmel River steelhead emerged. The benthic macroinvertebrate (BMI) data showed the presence of the introduced New Zealand Mud Snail (NZMS) (*Potamopyrgus antipodarum*). This was the first year that the lNZMS has been observed in the BMI sampling locations below Garland Park (RM 10.8) (MPWMD 2017). The mud snail comprised over 60% of the BMI in the samples (MPWMD 2017). High abundances of the 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. Rainbow trout lost up to 0.48 percent of their initial body weight each day, which is nearly equal to the impact of starvation, when fed an exclusive diet of NZMS (Vinson et al. 2008)

Loss of estuarine habitat through encroachment of residential development, and degradation of water quality from urban and agricultural runoff (including fine sediments and pesticides), as well as periodic unauthorized breaching of the Carmel River Estuary sandbar by private parties, has affected the ability of steelhead to utilize the lagoon for rearing.

Los Padres Dam and Fish Passage

The 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 habitat in the upper watershed for spawning and rearing of steelhead above the dam. About 250 feet downstream of LPD on the left bank, a Denil fish ladder is in operation to allow migrating steelhead to transit upstream into an adult fish trap. A ladder and trap system has been operational at LPD in most years since 1949. Steelhead are transferred from the fish trap to a truck via water-to-water transfer, hauled upstream of the dam crest, and released in the reservoir. The upstream passage structure is not functioning as intended. It has been observed that at lower flows (20 to 40 cfs) fish may have trouble accessing the holding gallery within the fish trap (AECOM 2023). At higher flows (>200cfs), adult steelhead are likely attracted to the big flow spilling over LPD and not the 10-15 cfs that passes through the ladder. This may lead to migration delays at the ladder when flows are under 40 cfs or over 200 cfs. Correlation with mean daily river flows and number of fish collected at the LPD indicates that most fish collected during the period of record from 1995 to 2019 occurred at mean daily flows between 20 and 200 cfs with an overall range from 10 to as high as 1,700 cfs (HDR et al. 2021). The inability of the ladder to function effectively over a wide range of flows would lead to skewed data on adult counts at LPD which has been a main data source for monitoring spawning adults in this reach of the river. More importantly, it can cause delays in upstream migration and inability to reach habitat that is considered important to population recovery, particularly during years of lower flow or drought.

Juvenile outmigrants and kelts have two pathways for downstream passage at LPD. A floating weir surface collector began operating in 2016 to provide volitional adult and juvenile steelhead passage downstream of LPD. The collector includes a floating behavioral guidance system that guides fish towards the entrance to a small, gravity-flow, floating collection barge with a gravity-flow pipeline (the structure is referred to as the floating weir surface collector, or "FWSC"). The other pathway is over the spillway which terminates into a 37-foot drop into a plunge pool that is approximately 10-feet deep. Flow in the spillway runs very shallow downstream of the crest, and has been documented to cause physical injury and induce mortality (Chaney 2011, Revised 2015). When flows are too low to spill over the dam, the only downstream passage is through the gravity flow pipeline. However, a study using PIT tag data found that the majority of fish used the spillway to migrate downstream and use of the bypass was not increased even when spillway over the dam was not possible (Ohms et. al. 2022). The study concluded that four factors consisting of water depths on the spillway, loss in the reservoir, migration delay and avoidance of the bypass has repeatedly limited downstream passage. They estimated the ability for fish to pass downstream was limited to only half the migration season in 55% of the past 20 years (2002-2021) (Ohms et al. 2022).

Carmel Lagoon

The Carmel Lagoon provides important PBFs for steelhead rearing and migration. Steelhead adults and smolts enter and exit the lagoon once the sandbar is open, which typically occurs during the wet season (December-June). 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. Water quality (temperature and dissolved oxygen) is often impaired throughout the summer and fall.

During fall and winter, increases in river inflow and/or large wave overwash events can cause a rapid increase in water height and threaten low-lying residential properties along the northern edge of the marsh and a road with flooding. For over a century, the threat of flooding has resulted in a long history of sandbar management to reduce flood risk and property damage. Prior to 2011, the sandbar was physically opened by machinery to evacuate the lagoon in the quickest and most efficient manner. However, since then, the Monterey County has shifted sandbar management practices to grading specific locations of the sandbar down to the highest elevation possible to avoid flooding, which allows the lagoon to rise and scour the channel on its own.

Breaching activities, especially when done out of season, can result in adverse effects to juvenile steelhead rearing habitat quantity and quality. In most years, the lagoon will experience a natural cycle of repeated open and close condition after the initial breach as inflow causes the lagoon to crest the newly formed sandbar; in some cases these openings are assisted by beach recreationists.

Effects of Water Withdrawals

Wells located below the former SCD withdraw water from the underflow of the Carmel River. As a result of these withdrawals, many of which were unauthorized, the Carmel River goes dry downstream of the Narrows (RM 9.5) usually by July of each year until the rains begin. In January of 2022, the State Water Resources Control Board (SWRCB) issued a cease-and-desist order to California America Water Company (CalAm) on their unlawful water. In the past, CalAm had exceeded approximately four times their water rights amounts in the Carmel River. There are a few surface diversions upstream of the former SCD site and about 300 private wells in the Carmel Valley Alluvial Aquifer. Most of the non-Cal-Am pumping is not subject to SWRCB jurisdiction. MPWMD requires all non-Cal-Am pumpers to file annual production reports; collectively, these non-Cal-Am diversions total between 2,000 and 2,400 acre-feet-per-year, with about 60 percent of diversions occurring in the dry season (June 1 through November 30) (AECOM 2023).

The lowered groundwater tables and drying of the lower river 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 Carmel River and lagoon, which can result in reduced growth and mortality of rearing fish.

Fish Rescues

There have been extensive population enhancement efforts carried out by MPWMD and the Carmel River Steelhead Association (CRSA) through the rescue of S-CCC steelhead from drying reaches of the watershed which are released into connected waters or temporarily held at Sleepy Hollow Rearing Facility. Although these restorations and population enhancement efforts along with several other habitat enhancement projects are expected to benefit S-CCC steelhead population in the long run, the near-term population response has yet to show improvement. This could be partially explained by delay between actions and population-level responses, which are expected to take several generations (i.e., 16-20 years) (Ohms et al. 2021). However, habitat issues persist such as stream channel drying, adult and juvenile steelhead passage at LPD, and the seasonal disconnection between the river and its lagoon during critical summer months in almost every year (Boughton et al. 2020).

Climate Change and the Carmel River

The long-term effects of climate change have been presented in Section 2.2.2; 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 temperatures in the Carmel would continue to increase, heat waves would become more extreme, and 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, for example, it is expected that streamflow will be further reduced and warmer during the summer. With the potential in decrease in waterflow the closure problems that the estuary experiences may become more frequent.

Recovery Actions

Although several detrimental actions and effects remain in the Carmel River watershed, there are also projects underway that should improve the habitat function for steelhead through floodplain connection, reduced water withdrawals and long-term beneficial effects from removal of SCD. Since adoption of the Recovery Plan in 2013, and NMFS' 2016 5-year review, the following key measures and restoration actions have addressed habitat concerns in the Carmel River (NMFS 2023):

- Removal of San Clemente Dam and Old Carmel River Dam on the lower mainstem of the Carmel River (NMFS 2013a: Recovery Action Car-SCCCS-4.3).
- Retirement of approximately 400 acre-feet of summer irrigation from the Rancho Canada Golf Course on the lower Carmel River (NMFS 2013a: Recovery Actions Car-SCCCS-4.1 – 4.2).
- Removal of steelhead passage barriers in portions of four tributaries to the Carmel River (San Clemente Creek, Cachagua Creek, Potrero Creek, Mainstem Creek) (NMFS 2013a: Recovery Actions Car-SCCCS-3.1 – 3.2).
- Initiation of an alternative water supply (Pure Water Monterey) for the Carmel River water service area, installation of large woody debris in to the Carmel River Estuary, and spawning gravel supplementation at the base of Los Padres Dam (NMFS 2013a: Recovery Actions Car-SCCCS-S-4.1 – 4.2; Car-SCCCS-S-12.1; Car-SCCCS-7.1)

2.4.3 Implementation of Activities Covered under the Corps RGP for the Years 2009-2023

Under the previous NMFS BO that covered RGP (244600S) activities from 2018-2023, work occurred at 42 sites within the action area. The work involved vegetation management which included clearing debris piles and notching, cutting, and trimming of large fallen trees in the active channel. Previous programmatic biological opinions and Corps permits have been issued for this program. Between 2009 and 2018, there were two concrete removal projects over a total area of 100 square feet. Historically more bank stabilization projects occurred; the most recent bank stabilization project occurred in 2005. From 1991-2005 (15 years), there were 14 bank stabilization projects implemented on over 9,910 lf within the action area. The average length of the projects was 668 lf and ranged from 50-2600 lf. These slope protection projects used more traditional bank stabilization methods (primarily RSP). From 2005 to 2023, linear extent of bank stabilization has been reduced and modified to consist of bioengineered methods which has greatly reduced habitat impacts for these kinds of activities.

2.4.4 **Previous Section 7 consultations and Section 10 Permits in the Action Area**

This section is organized by the date in which the consultation was completed, starting with more recent to less recent.

Carmel Lagoon Scenic Road Protection Structure and Interim Sandbar Management Plan Project (WCRO-2013-00009, ARN 151422SWR01SR277)

On December 2, 2019, NMFS and the Corps completed formal section 7 consultation for Carmel Lagoon Scenic Road Protection Structure and Interim Sandbar Management Plan Project proposed by the Monterey County Resource Management Agency (MCRMA). NMFS concluded the Project is not likely to jeopardize the continued existence of the S-CCC steelhead, nor result in the destruction or adverse modification of designated critical habitat for S-CCC steelhead.

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 (WCRO-2019-02285, ARN 151422WCR2019SR00182)

On August 29, 2019, NMFS issued a Section 10(a)(1)(A) permit for the Monterey Peninsula Water Management District's rescue and relocation program 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. NMFS' biological opinion concluded that the proposed action was not likely to jeopardize the continued existence of S-CCC steelhead or destroy or adversely modify its designated critical habitat.

Memorandum of Agreement (MOA) among the California-American Water Company, National Marine Fisheries Service, and the California State Coastal Conservancy (NMFS PCTS # WCR-2017-7369, ARN: 151422SWR2017SR00186)

On December 8, 2018, NMFS completed a formal section 7 consultation on its action of entering into the proposed 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 proposed MOA succeeded earlier agreements with the same purpose concluded in 2001 and 2009. The MOA includes an agreed upon set of activities for 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. The programmatic biological opinion analyzed the effects of the MOA activities and concluded NMFS' signing of the MOA and thus, implementation of the MOA, would not jeopardize the continued existence of S-CCC steelhead, nor adversely modify or destroy their critical habitat.

Reinitiation of the Carmel Lagoon Interim Sandbar Management Plan (*WCR-2018-10947, ARN 151422WCR2015SR00132)*

On November 20, 2018, NMFS and the Corps completed informal section 7 consultation to permit Monterey County Resource Management Agency's (RMA) Interim Sandbar Management

Plan (ISMP) in the Carmel River Lagoon. The letter of concurrence analyzed the effects of the project and concluded that the project was not likely to adversely affect S-CCC steelhead or designated critical habitat.

Regional General Permit (RGP) for Carmel River Restoration & Maintenance Activities (NMFS PCTS # SWR-2000-1889, ARN: 151422SWR2000SR148, Cabinet 4B); NMFS Response March 12, 2004 and Carmel River Restoration and Maintenance RGP (NMFS PCTS# SWR-2010-2234 ARN#:151422SWR2000SR148); NMFS response August 30, 2010 and RGP for Carmel River Restoration & Maintenance Project (WCR-2018-10492, ARN# 151422SWR2001SR247); NMFS response August 10, 2018.

In 2004, 2010, and 2018, NMFS and the Corps completed programmatic formal section 7 consultations and EFH consultations on MPWMD's program, and programmatic biological opinions were issued. The program included maintenance and restoration activities along tributaries and mainstem of the Carmel River from SCD to the Carmel Lagoon. The programmatic biological opinions analyzed the effects of the project and concluded that the proposed project will not jeopardize the continued existence of S-CCC steelhead, nor adversely modify or destroy their critical habitat. In addition, the project was determined to adversely affect EFH, however, no EFH Conservation Recommendations were provided, because the project included measures to avoid, minimize, mitigate, or otherwise offset potential adverse effects to EFH.

Sleepy Hollow Steelhead Facility Raw Water Intake and Water Supply System Upgrade in Carmel, California (NMFS PCTS# WCR-2017-7501, ARN 151422WCR2017SR00199)

On February 14, 2018, NMFS and the Corps completed a formal section 7 consultation on MPWMD's proposal upgrade the Sleepy Hollow Steelhead Facility to improve the reliability of the water supply intake and the quality of the intake water. The programmatic biological opinion analyzed the effects of the project and concluded that the proposed project would not jeopardize the continued existence of S-CCC steelhead, nor adversely modify or destroy their critical habitat.

Carmel Lagoon Interim Sandbar Management Plan (NMFS PCTS # WCR-2015-2584, ARN: 151422WCR2015SR00132)

On May 7, 2015, NMFS and the Corps completed an informal section 7 consultation and EFH consultation on a Monterey County proposal to manage the Carmel Lagoon sandbar from April 2015 to October 2016. The concurrence letter concluded the project was not likely to adversely affect S-CCC steelhead or their designated critical habitat. In addition, the project was determined to adversely affect EFH, however, no EFH Conservation Recommendations were provided because the project included measures to avoid, minimize, mitigate, or otherwise offset potential adverse effects to EFH.

Panetta Well Project (CAW) (PCTS# WCR-2014-0425, ARN 151422WCR2014SR00039)

On July 8, 2014, NMFS and the Corps completed informal section 7 consultation for the proposed Panetta Well Blow-off and Drain Installation Project. The proposal included installing a 6-inch-in-diameter pipe to the existing Panetta Well in order to transport well blow-off water into the Carmel River. The letter of concurrence analyzed the effects of the project and concluded that the project was not likely to adversely affect S-CCC steelhead or designated critical habitat.

Hacienda Bridge Maintenance Project (NMFS PCTS# WCR-2014-0817, ARN 151422WCR2014SR00028)

On May 13, 2014, NMFS and the Corps completed informal section 7 consultation for Hacienda Carmel Community Association's proposed maintenance activities; including the reinforcement the bridge supports. The letter of concurrence analyzed the effects of the project and concluded that the project was not likely to adversely affect S-CCC steelhead or designated critical habitat.

Reinitiation of Carmel River Reroute and San Clemente Dam Removal Project (NMFS PCTS # SWR-2013-9633, ARN:151422SWR2012SR00254)

On June 3, 2013, NMFS and the Corps completed reinitiation of formal section 7 consultation and EFH consultation on the CAW's proposed changes to the Carmel River Reroute and San Clemente Dam Removal Project (PCTS # SWR-2012-2129) since the issuance of the 2012 programmatic biological opinion. CAW proposed to change the location of access roads, the schedule of construction, the staging and equipment off-loading areas, and the strategy for diverting flows around the reservoir. The programmatic biological opinion analyzed the effects of the project and concluded that the proposed project would not jeopardize the continued existence of S-CCC steelhead, nor adversely modify or destroy their critical habitat. In addition, the project was determined to adversely affect EFH, however, no EFH Conservation Recommendations were provided, because the project included measures to avoid, minimize, mitigate, or otherwise offset potential adverse effects to EFH.

Carmel River Reroute and San Clemente Dam Removal Project (NMFS PCTS # SWR-2012-2129, ARN: 151422SWR2012SR00254)

On July 23, 2012, NMFS and the Corps completed a formal section 7 consultation and EFH consultation on CAW's proposal, remove of SCD, and realign the Carmel River to bypass the majority of accumulated sediment in the reservoir through rerouting of the mainstem. The programmatic biological opinion analyzed the effects of the project and concluded that the proposed project would not jeopardize the continued existence of S-CCC steelhead, nor adversely modify or destroy their critical habitat. In addition, the project was determined to adversely affect EFH, however, no EFH Conservation Recommendations were provided, because the project included measures to avoid, minimize, mitigate, or otherwise offset potential adverse effects to EFH.

Flood Protection at Carmel River Lagoon (NMFS PCTS # SWR-2011-5438, ARN: 151422SWR2011SR00542)

On October 28, 2011, NMFS and the Corps completed informal section 7 consultation on a Monterey County proposal to manage the Carmel Lagoon sandbar from October 2011 to September 2012. The purpose of the project was to maintain the highest possible lagoon volume at the beginning of the dry season to promote good water quality for steelhead. The letter of concurrence concluded the project was not likely to adversely affect S-CCC steelhead or designated critical habitat.

Carmel Lagoon Water Level Adaptive Management Project (NMFS PCTS # SWR-2009-2325, ARN: 151422SWR2008SR00416)

On May 12, 2009, NMFS and the Corps completed informal section 7 consultation on a California State Parks proposal to modify the Carmel Lagoon sandbar during spring and summer 2009 (usually by closing the outlet channel to the ocean). The purpose of the project was to maintain the highest possible lagoon volume at the beginning of the dry season to promote good water quality for steelhead. The concurrence letter concluded that the project was not likely to adversely affect S-CCC steelhead or designated critical habitat.

Carmel River Steelhead Association LWD Project (NMFS PCTS# SWR-2008-7150, ARN 151422SWR2008SR00400)

On February 12, 2009, NMFS and the Corps completed informal section 7 consultation on Carmel River Steelhead Association's proposal to place LWD complexes at seven locations in the Carmel Lagoon. The letter of concurrence concluded the project was not likely to adversely affect S-CCC steelhead or designated critical habitat.

San Clemente Dam Geotechnical Explorations (NMFS PCTS# SWR-2007-6489; ARN 151422SWR2007SR00440)

On October 2, 2007, NMFS and the Corps completed informal section 7 consultation on a MWH America, Inc. proposal to drill multiple borings and test pits in Carmel River and San Clemente Creek. The letter of concurrence analyzed the effects of the project and concluded that the project was not likely to adversely affect S-CCC steelhead or designated critical habitat.

California American Water San Clemente Reservoir Drawdown 2007-2012 (PCTS # SWR-2007-2261, ARN: 151422SWR2007SR00150)

In 2003, 2004, 2006 and 2007, NMFS completed formal section 7 consultations with the Corps for the SCD Drawdown Project. The 2007 programmatic biological opinion, issued May 23, 2007, was reaffirmed by NMFS in 2012 for an additional year via a letter dated May 21, 2012. The project included annual fish rescues and water quality monitoring during lowering of the reservoir water during the summer months for dam safety. NMFS concurred with the Corps' determination that the project was likely to adversely affect S-CCC steelhead, but not jeopardize the species nor adversely modify critical habitat.

Carmel Lagoon Enhancement Project (NMFS WCRO-2013-00009, ARN 151422SWR02SR8490)

On February 13, 2004, NMFS and the Corps completed a formal section 7 consultation on California Department of Parks and Recreation's proposal to create woody riparian, freshwater wetland, and open water habitat in an extension of the south arm of the Carmel Lagoon. The project included grading and dredging to accomplish project objectives. The biological opinion concluded the proposed project would not jeopardize the continued existence of S-CCC steelhead, nor adversely modify or destroy their critical habitat.

San Clemente Reservoir Sediment Characterization (NFMS PCTS# SWR-2002-1653, ARN 151422SWR2002SR6421)

NMFS and the Corps completed informal section 7 consultation on a CAW proposal to survey multiple locations with the San Clemente Reservoir to determine the characteristics of the accumulated sediments in the re reservoir. A concurrence letter was issued on July 26, 2002. The letter of concurrence analyzed the effects of the project and concluded that the project was not likely to adversely affect S-CCC steelhead or designated critical habitat.

Emergency consultations on sandbar breaching

As previously stated, the mechanical breaching of the Carmel Lagoon has been carried out by Monterey County or State Parks at least once a year since 1973, and more frequently in some years. In the past, breachings have been carried out as early as October and as late as June. At first, the sandbar was breached without Corps authorization, and more recently the activity has been conducted under the auspices of an emergency Corps RGP-5 Permit to temporarily alleviate flood threats. These breachings have negatively affected S-CCC steelhead by draining the lagoon. The draining of the lagoon can flush steelhead into the ocean, reduce rearing habitat, and degrade water quality (see Section 2.4.2.3 Carmel Lagoon for a more complete discussion).

Programmatic Implementations under NOAA's Restoration Center (WCR-2015-3755; ARN 151422WCR2015SR00285)

Several projects were implemented under the NOAA Restoration Center's PBO including:

- Carmel River Pipeline Removal and Habitat Restoration Project (December 9, 2020);
- No Name Road Ford Removal and Fish Passage Project (April 8, 2020);
- Portero Creek Fish Passage Project (March 27, 2020);
- Carmel River Estuary LWD Project (August 1, 2016).

2.5 Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action but that are not part of the action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.02).

Effects to listed S-CCC steelhead and their critical habitat caused by activities associated with this project will depend upon the amount, scope, and specific locations of potential projects. In addition, floods or severe storms would significantly influence the volume and frequency of future activities.

2.5.1 **Disturbance or Removal of Riparian Vegetation**

Both maintenance and restoration activities covered by the Program could result in small scale changes to riparian habitat including the trimming/removal of vegetation for stream access, slope protection and maintenance of channel capacity. All work would occur during the dry season (July 1-October 31) and any extension of this work window will need prior approval from NMFS.

2.5.1.1 Removal of Riparian Vegetation

Instream and near stream construction associated with maintenance and enhancement projects would likely require the removal of riparian vegetation. When riparian vegetation is removed it can result in a loss of shade, increases in temperatures, decreases in cover, and a reduction in terrestrial food sources and future large wood recruitment. Riparian zones play an important role in stream ecosystems by providing shade, sediment storage, nutrient and invertebrate inputs, channel and stream bank stability, habitat diversity, and cover and shelter for fish (Grunblatt et. al. 2019, Murphy and Meehan 1991). Vegetation along stream banks also functions to trap fine sediments as they are washed toward streams during rainstorms. Streams are sensitive to loss of riparian habitat and shade, which moderates stream temperatures by insulating them from solar radiation and reducing heat exchange with the surrounding air. This function is particularly important for the Carmel River, where summer air temperatures are high.

The amount of vegetation removed for bank stabilization sites is anticipated to be very small, because most sites will already be denuded of vegetation as a result of bank erosion (Figure 1). For Fisheries Habitat Enhancement sites, vegetation may be present, but the vegetation community will likely be of low quality or contain a sparse amount of vegetation. This is because enhancement efforts will target sites where fisheries habitat needs to be improved. It is likely in these areas that large native trees will be kept to the greatest extent possible. Trees that are removed will be replaced at a ratio of 3 new plantings per each tree removed. All disturbed areas that had a mix of native and non-native (weedy) vegetation will be replanted by all native vegetation and will result in greater than 1:1 replacement of native vegetation. Additionally, existing vegetation will be preserved by limiting the work site to the smallest possible area required to safely and efficiently complete the work. Only one access point will be made for construction equipment through riparian vegetation.

NMFS expects the removal of vegetation for bank stabilization activities to result in localized, temporary reductions in vegetation within project sites. In one year, up to 1,200 linear feet of bank stabilization could occur. Of this, up to 240 linear feet (20 percent) could consist of hardscape, thus the remaining 960 linear feet would consist of "soft" bioengineering materials. For Fisheries Enhancement Activities, the goal is to improve fish habitat conditions which inherently limits the degree in which vegetation could be altered. The loss of the stream side vegetation from the project throughout the action area (lower 18.5 miles) is not expected to appreciably increase stream water temperatures (above the pre-project temperatures) as a majority of the river bank will remain untouched. In both bank stabilization and enhancement activities (where necessary), bioengineering will encourage vegetation establishment along the bank and at the top of the bank to stabilize the bank and prevent future erosion at the site. Thus, bank stabilization and enhancement activities using bioengineering techniques are expected to convert denuded exposed slopes into vegetated slopes.

Banks and low floodplain terraces will be revegetated with willow, cottonwood, sycamore, box elder, elderberry, and other native riparian species. Special emphasis will be placed on revegetation with plant species that are appropriate for the restored bank or terrace elevation and moisture condition. If needed, an irrigation system will be installed and operated for a minimum of 3 years. This will allow for greater plant survival rates and quicker site restoration. The integration of topsoil into the slope assists in the retention of moisture and provides a nutrient-rich medium for root development.

Overall, the removal of riparian vegetation along the Carmel River for construction will result in a temporary reduction in stream shelter and, potentially, wood recruitment to the river. However, the projects will be revegetated with common and native fast-growing species (willow, cottonwood, cattails, etc.) and will ultimately expand the abundance and diversity of native vegetation communities. With the restoration of natural vegetation communities in the bank stabilization and Fisheries Habitat Enhancement sites, the temporary loss of vegetation along the river is not expected to appreciably diminish the function or quality of critical habitat for S-CCC steelhead or result in physical or biological changes sufficient to reduce the individual performance of steelhead. NMFS anticipates that the native vegetation abundance and quality along the river will exceed pre-project conditions within a few years post-construction.

2.5.1.2 <u>Removal of In-Channel Vegetation and Large Wood</u>

In-channel vegetation and large wood play an integral part in channel form by trapping sediment deposits and helping to form riffles, pools, meanders and habitat for steelhead. In addition, large wood creation of pools influences the distribution and abundance of juvenile salmonids (Spalding et al. 1995, Beechie and Sibley 1997). Large wood is commonly produced from riparian areas and is important in many stream ecosystems for stabilizing channel form, storing and metering sediments during sediment routing, and modulating flow hydraulics during various flows, i.e., dissipating kinetic energy (Cederholm et al. 1997). Steelhead production in rearing habitats is increased when an abundance of escape cover (e.g., hiding spots provided by water depth, vegetation, large wood, interstitial spaces in substrate, undercut banks) exists along with forage stations (places of very low water velocity next to threads of higher water velocity in which aquatic invertebrates are entrained (Fausch and Northcote 1992, Spalding et al. 1995). Normally, pool-riffle sequences are integral to this composition. Pools provide depth, cover, and still water, and riffles provide forage and increase oxygenation of water. Pool tails are commonly spawning beds for most steelhead. Adults also require deep pools as holding habitat during their upstream migrations. The size of large wood is important for habitat creation (Fausch and Northcote 1992).

The project will include activities conducted by MPWMD designed to maintain the integrity of channel capacity. This entails the trimming and removal of vegetation and woody debris from the channel to alleviate potential bank failure and threats to infrastructure from redirected river flow (Figure 2). Also, to control poison oak, MPWMD uses Rodeo or a technical grade of glyphosphate (without surfactant), which has been found to have no deleterious effects to steelhead (NMFS 2003, NMFS 2017). The annual maximum amount of vegetation and wood management to be conducted under the program is three miles. No more than 50 contiguous feet of stream shade will be modified or removed. Only large wood (four inches or greater in diameter or three feet or longer in length) that poses a significant threat to property or bridge will be modified (See Project Description for the decision matrix (Figure 3-6). In some cases (e.g., a downed tree completely spanning a bridge pier) wood will need to be cut multiple times. Annual reports submitted to NMFS, since 2013 illustrate that trimming of vegetation channel encroachment and large wood modification is consistently much lower than the 3-mile maximum length and modifies the least amount needed. NMFS expects this activity will continue in the same manner over the timeframe of this programmatic biological opinion.

Effects on steelhead and critical habitat from removal of in-channel vegetation and large wood can include: reduction in channel complexity, prey base for juvenile steelhead, habitat diversity by reducing large wood, and the amount of vegetative matter as a food source for steelhead prey. The magnitude of in-channel vegetation and large wood loss due to channel maintenance activities will vary depending on the number and type of activities and the location of projects completed each year. MPWMD strives to maintain as much vegetation and large wood in the channel as possible by selectively removing vegetation and large wood that poses a hazard to infrastructure and bank stability, and trimming rather than completely removing vegetation from the banks. Nonetheless, similar to the effects of removing vegetation for bank stabilization and habitat enhancement projects, the maintenance of riparian vegetation and large wood within the Carmel River will result in alterations to stream shelter and, potentially, wood recruitment to the river. However, the temporary loss of in-channel vegetation and large wood along the river is not expected to appreciably reduce PBFs for S-CCC steelhead migration and seasonal rearing, nor will it result in reductions in fitness of individual steelhead due to the management practices for large wood and the small localized areas where this maintenance will occur.

2.5.2 **Increases in Turbidity and Sedimentation**

Instream and near-stream construction associated with maintenance and enhancement projects may result in sediment entering the stream through the disturbance of the streambed and banks during project implementation. Sediment may affect fish by a variety of mechanisms. High concentrations of suspended sediment can disrupt normal feeding behavior and efficiency (Cordone and Kelley 1961; Bjornn et al. 1977; Berg and Northcote 1985), reduce growth rates (Crouse et al. 1981), and increase plasma cortisol levels (Servizi and Martens 1992). High turbidity concentrations can reduce dissolved oxygen in the water column, result in reduced respiratory functions, reduced tolerance to diseases, and can also cause fish mortality (Sigler et al. 1984; Berg and Northcote 1985; Gregory and Northcote 1993; Velagic 1995; Waters 1995). Even small pulses of turbid water will cause salmonids to disperse from established territories (Waters 1995), which can displace fish into less suitable habitat and/or increase competition and predation, decreasing chances of survival. Increased sediment deposition can fill pools and reduce the amount of cover available to fish, decreasing the survival of juveniles (Alexander and Hansen 1986).

Much of the research discussed in the previous paragraph focused on turbidity levels higher than those anticipated to occur from activities associated with the program. This is because MPWMD will implement various AMMs and BMPs to avoid and minimize sedimentation and turbidity (Section 1.3.3). When used, heavy equipment will work from the top of bank or from a dry stream bed and erosion and pollution control measures will be implemented to contain loose sediment and contaminants. Post-construction, disturbed areas will be stabilized with biodegradable geotextile fabric and/or vegetative plantings, as appropriate so a minimal area of disturbed, exposed soils remain post-construction. Based on this, NMFS expects program activities will result in small elevated turbidity levels for a short period, and be well below levels and durations shown in the scientific literature as causing injury or harm to salmonids (see for example Sigler et al. 1984 or Newcombe and Jensen 1996). These short-term turbidity pulses during the first fall rains are expected to be similar to the ambient level of suspended sediment during storms. NMFS expects any sediment or turbidity generated by projects would not extend more than 150 feet downstream of the work site based on the site conditions and methods used to control sediment. NMFS does not expect the temporary and slight increase in suspended sediment concentrations downstream of work sites will reach the scale where salmonid fitness or PBFs of critical habitat will be significantly affected.

2.5.3 **Hardening of Streambanks**

Bank stabilization projects preclude the natural fluvial and geomorphic processes inherent in natural and unaltered streams. Streams transport water and sediment from upland sources to the ocean and, generally speaking, the faster the streamflow, the greater the erosive force. Natural processes constrain and moderate these erosive forces, such as when complex structure both within (e.g., boulders or woody debris) and adjacent (e.g., riparian vegetation) to the stream channel slows the water velocity and, by extension, its erosive force (Knighton 1998). Where existing geology and geomorphology allow, a stream channel will also naturally “meander”, eroding laterally to dissipate its hydraulic energy while creating a sinuous longitudinal course. Stream meandering efficiently regulates erosive forces by lengthening the channel and reducing stream gradient, thus controlling the ability of the stream to entrain and transport available sediment. Meandering streams also create and maintain both the hydraulic and physical components of instream habitat used by fish and other aquatic species. For instance, specific to salmon and steelhead, a meandering, unconstrained stream channel sorts and deposits gravel and other substrate necessary for optimal food production and spawning success, maintains a healthy and diverse riparian corridor that supplies LWD, and allows floodplain engagement during appropriate winter flows (Spence et al. 1996).

By design, streambank stabilization projects prevent lateral channel migration, effectively forcing streams into a simplified linear configuration that, without the ability to move laterally, instead erode and deepen vertically (Leopold et al. 1968; Dunn and Leopold 1978). The resulting “incised” channel fails to create and maintain aquatic and riparian habitat through lateral migration, and can instead impair groundwater/stream flow connectivity and repress floodplain and riparian habitat function. The resulting simplified stream reach typically produces limited macroinvertebrate prey and poor functional habitat for rearing juvenile salmonids (Pollock et al. 2007; Florsheim et al. 2008). Because bank stabilization utilizing rip rap is typically designed to withstand high streamflow caused by large storm events, the rip-rap structure, and by extension the impacts to instream habitat, are in effect everlasting, harming future fish generations in perpetuity. Moreover, streambank stabilization impacts not only extend temporally; altered geomorphic and hydraulic processes can propagate spatially both upstream and downstream of hardened bank structures, dependent upon site- and structure- specific characteristics (Henderson 1986 and Arnaud-Fassetta et al. 2005, as cited in Florsheim et al. 2008), meaning that "bank stabilization often begets more bank stabilization." Finally, rip- rap as a stabilization material immediately and permanently replaces a natural earthen streambank, which can provide complex fish habitat (e.g., undercut banks, submerged rootwads, etc.) (Fischenich and Copeland 2001), with a relatively simple, homogenous streambank structure less suitable for juvenile salmon and steelhead (Schmetterling et al. 2001; Fischenich 2003).

The bank stabilization projects will be implemented along unstable, degraded areas of banks that have eroded and are causing sediment input into the river or in areas where additional bank erosion would threaten structures along the riverbank. MPWMD will use bioengineered methods as a first choice and limit the amount of RSP to 240 feet annually and 480 linear feet over the duration of the Program (about 5 years). An example of a bioengineered method is the installation of complex large wood within the structure below the ordinary high-water level in order to improve habitat complexity and thwart future channel incision (Figure 7). The majority of these sites are located on the outside of meander bends or in areas where bank vegetation has eroded away. These projects are expected to occur infrequently and will likely be associated with flooding/large river flows.

Nevertheless, by stabilizing banks within the Carmel River with RSP in addition to what has previously been hardened, some slope protection projects will likely compromise the value of available critical habitat for spawning, migrating, and rearing, by precluding natural fluvial and geomorphic processes within the action area for the foreseeable future. Thus, for species with typically short life-spans (3-4 years for steelhead), bank stabilization will not only impact individual fish but likely manifest population-level impacts also. The long-term impacts from bank stabilization likely portends decreased productivity and abundance of Carmel River steelhead in the action area over successive generations. In effect, slope protection projects will perpetuate the diminished carrying capacity that already exists within the action area.

Quantifying the number of individuals harmed, injured or killed by each bank stabilization project is difficult, given the complex and variable components at play. Some rearing steelhead in the project area would move away seeking more suitable habitat, however, a number of individuals would remain in the area directly adjacent to the shoreline. Some proportion (likely small) of these individuals would indirectly be injured or killed from bank stabilization as a result of reductions in cover and forage habitat. Individual fish behavior, and how that behavior adapts to evolving habitat conditions, will primarily influence how many fish will be impacted by the bank stabilization projects and to what degree. NMFS cannot provide an amount of steelhead that would be adversely affected by the bank stabilization projects, yet we believe the amount of fish harmed is strongly correlated to the linear feet of slopes that are protected (hardened) by the program: 480 linear feet. Also, projects carried out under the program will be limited to those that protect critical infrastructure or property, sparsely vegetated eroded banks or streambanks that have previously been stabilized. Replacing this poor habitat with bio-engineered stabilization and riparian planting will likely improve existing habitat at project sites over time, improving salmonid growth and survival (Zika and Peter 2002). Because bank stabilization will consist of a very small area relative to the stream area available to rearing juveniles throughout the action area, and because of the bioengineering techniques and limits noted above, NMFS expects overall reductions in juvenile steelhead numbers to be minimal. While NMFS expects some PBFs of critical habitat may improve with revegetated banks, the adverse impacts of ongoing channelization on critical habitat function in the action area will result from the program.

2.5.4 **Toxins from Accidental Spills/Leaks**

Maintenance and enhancement activities in and adjacent to the stream can involve the use of heavy machinery in close proximity to the channel or in the dry channel bed. The use of heavy machinery in the stream creates the potential for toxic materials associated with mechanical equipment, such as fuels, motor oils, and antifreeze to enter the stream or channel. Oils and similar substances from construction equipment can contain a wide variety of polynuclear aromatic hydrocarbons (PAHs), and metals. Both can result in adverse impacts to salmonids. PAHs can alter salmonid egg hatching rates and reduce egg survival as well as harm the benthic organisms that are a salmonid food source (Eisler 2000). Some of the effects that metals can have on salmonids are: immobilization and impaired locomotion, reduced growth, reduced reproduction, genetic damage, tumors and lesions, developmental abnormalities, behavior changes (avoidance), and impairment of olfactory and brain functions (Eisler 2000).

The implementation of avoidance and minimization measures would reduce the chances of toxins entering streams. Specifically, instream construction would be limited to the dry season (July 1 - October 31) and heavy equipment would only be operated in a dry or dewatered stream bed and remain at the top of the bank. Pollution control measures, such as keeping spill containment and remediation material nearby and refueling and servicing vehicles outside of the stream bed would also be implemented at the work site. Due to these measures, NMFS expects that accidents will be minimized during construction. However, even with the appropriate measures in place some residual toxins from equipment could be deposited in work sites via small leaks and enter the stream. The amount of toxins entering the stream from the work site would be very small and, depending on the chemical, will either be: 1) flushed from the area over a short period of time after re-watering of work sites or after the first subsequent rain; or 2) attached to sediments in the creek bed. These sediments may be flushed by subsequent winter storms, depending on particle size. Some toxins will also separate from sediments during high flows and be flushed from the site. For these reasons, the potential for steelhead to be exposed to these toxins is extremely low, and if they are, NMFS expects the amount of time and the concentration of toxins they may be exposed to will be below thresholds known to cause reductions in fitness. For the same reasons, NMFS does not expect construction-related toxins to degrade PBF's of critical habitat.

2.5.5 **Fisheries Enhancement Actions**

Projects may include placement of log and boulder groups, spawning gravel augmentation, and/or revegetation of riparian habitat along the banks of the river. Instream habitat structures and improvement projects will provide escape from predators and resting cover, increase spawning habitat, improve upstream and downstream migration corridors, improve pool to riffle ratios, and add habitat complexity and diversity. Some structures will be designed to reduce sedimentation, protect unstable banks, stabilize existing slides, provide shade, and create scour pools. All methods and project designs will be provided to NMFS for approval prior to project implementation and will be generally consistent with the methods in NOAA Fisheries Restoration Center's Central California Coast Restoration Project Programmatic Biological Opinion (NMFS 2015).

These projects will be stand-alone activities and are not associated with maintenance bank stabilization. The goals of these actions are to reduce the potential for future bank stabilization projects and increase the quantity and quality of rearing and spawning habitat. However, these activities will cause temporary adverse effects as described in Removal of Riparian Vegetation (Section 2.5.1.1), Increase in Turbidity and Sedimentation (Section 2.5.2), and Toxins from Accidental Spills (Section 2.5.4). In the event project sites will be dewatered for bank or channel enhancement features, there will be adverse effects that are considered under Dewatering (Section 2.5.7) and Relocation of Steelhead from Project Sites (Section 2.5.6). A cumulative maximum of 2,000 feet dewatered over 5 years of Fisheries Enhancement Activities will be covered under the PBO.

Enhancement activities are designed to improve PBFs for steelhead by improving spawning habitat or complexity for rearing and migration habitat. Placement of LWD into streams can result in the creation of pools that influence the distribution and abundance of juvenile salmonids (Spalding et al. 1995, Beechie and Sibley 1997). Presence and abundance of LWD is correlated with growth, abundance and survival of juvenile salmonids (Fausch and Northcote 1992, Spalding et al. 1995). The size of LWD is important for habitat creation (Fausch and Northcote 1992). Spawning gravel augmentation will provide long-term beneficial effects by increasing spawning gravel availability while reducing inter-gravel fine sediment concentrations.

NMFS considers that the long-term beneficial impacts of restoration projects designed to enhance PBFs for steelhead far outweigh the temporary and often minor effects associated with these projects. Although some fisheries enhancement projects may cause small losses of juvenile steelhead in the project areas during construction, all of these projects are anticipated to improve steelhead habitat and survival over the long-term.

2.5.6 **Relocation of Steelhead from Project Sites**

Prior to and during the dewatering of the project site, qualified fisheries biologists would collect fish and relocate them from the project areas to avoid fish stranding and exposure to construction-related effects. Only rearing juvenile steelhead are likely to be present at work sites during the July 1 through October 31 construction period. Due to the timing of the instream construction activities, no active migration occurs so steelhead adults or smolts will not be adversely affected by the dewatering and fish collection.

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. 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.

Based on information from other relocation efforts that used similar methods and occurred in similar types of aquatic habitat, NMFS estimates injury and mortalities will be less than three percent of those steelhead that are relocated. Data on fish relocation efforts between 2002 and 2009 show most mortality rates are below 3 percent (2 percent) for steelhead (Collins 2004; CDFG 2005; 2006; 2007; 2008; 2009; 2010).

MPWMD conducts annual fall steelhead juvenile population surveys at eight sites throughout the action area (lower 18.6 miles). To estimate the amount of steelhead that may need to be captured and relocated we looked at density data from these action area sites from 2010 to 2023. The densities of steelhead vary widely between years and sites. Because we do not know the exact location of where the projects will occur, a historic average of all the sites within the action area will be used to determine extent of incidental take. The annual results range from no detection (0) to a high of 1.91 fpf. The average of each site over those 14 years ranged from a low of 0.22 fpf from the lowest reach (RM 8) to the high of 1.03 fpf (RM 12.7). To estimate the amount of mortality or injury from dewatering and relocating fish annually and over the program duration (5 years) we will use the average high of 1.03 fpf for all locations. Due to uncertainty in project locations and the variation in yearly juvenile densities, we will approximate an additional 25% above the average high to cover years of increased juvenile densities. This estimate of 1.3 fpf should adequately cover the extent of mortality or injury anticipated regardless of where the projects occur based on the past frequency and extent of projects that have occurred in recent years.

Bank stabilization activities will entail dewatering and relocating steelhead from a maximum cumulative stream length of 1,200 linear feet (lf) annually, and 2,400 lf over the BO timeframe. Fisheries habitat enhancement activities that entail dewatering will dewater a cumulative maximum of 2,000 linear feet over 5 years. The maximum length of dewatering that will occur for each enhancement project is 600 lf and NMFS expects the annual average distance of stream dewatering for fisheries enhancement projects will be 600 lf.

Based on the juvenile density estimates described above and the amount of stream to be dewatered each year and cumulatively over the 5-year permit term, NMFS expects the following number of juvenile steelhead to be encountered during fish relocation activities:

Bank Stabilization

- up to 1560 juvenile steelhead annually in up to 1200 lf or dewatered stream; and
- up to 3120 juvenile steelhead over 5 years in up to 2400 lf of cumulative dewatered stream reaches.

Fisheries Enhancement

- up to 780 juvenile steelhead annually in up to 600 lf of dewatered stream; and

- up to 2600 juvenile steelhead over 5 years in up to 2000 lf of cumulative dewatered stream reaches.

Based on the juvenile density estimates described above and the amount of stream to be dewatered each year and cumulatively over the 5-year permit term, NMFS expects the following number of juvenile steelhead to become injured or die during fish relocation activities:

Bank Stabilization

- up to 32 juvenile steelhead annually in up to 1200 lf or dewatered stream; and
- up to 63 juvenile steelhead over 5 years in up to 2400 lf of cumulative dewatered stream reaches.

Fisheries Enhancement

- up to 16 juvenile steelhead annually in up to 600 lf of dewatered stream; and
- up to 52 juvenile steelhead over 5 years in up to 2000 lf of cumulative dewatered stream reaches.

Although sites selected for relocating fish should have similar water temperature as the capture sites and should have ample habitat, in some instances relocated fish may endure short-term stress from crowding at the relocation sites, particularly due to water temperatures that are less than ideal during summer construction activities. Fish may also have to compete with other fish causing increased competition for available resources such as food and habitat. Frequent responses to crowding by steelhead include emigration and reduced growth rates (Keeley 2001). Some of the fish released at the relocation sites may choose not to remain in these areas and move either upstream or downstream to areas that have more vacant habitat and a lower density of steelhead. As each fish moves, competition remains either localized to a small area or quickly diminishes as fish disperse. NMFS cannot accurately estimate the number of fish affected by competition, but does not believe this impact will adversely affect the survival chances of individual steelhead, or cascade through the watershed population of these species based on the small area that will likely be affected and the small number of steelhead likely to be relocated. Sufficient habitat appears to be available within the Carmel River watershed to sustain fish relocated without crowding other juvenile steelhead, and NMFS expects these fish will be able to find food and cover upstream or downstream of project reaches as needed during construction. In addition, if there are any chance of overcrowding an area then the steelhead will be brought to the Sleepy Hollow Steelhead Rearing Facility.

2.5.7 **Project Site Dewatering**

Some maintenance and enhancement activities will require stream flow diversion and project work area dewatering. Benthic (bottom dwelling) aquatic macroinvertebrates within the project site may be killed or their abundance reduced when habitat is dewatered (Cushman 1985). However, effects to aquatic macroinvertebrates resulting from stream flow diversion and dewatering will be temporary because construction activities will be relatively short-lived (maximum 60 days) and the dewatered reach would be small (maximum 600 feet).

Recolonization of disturbed areas by macroinvertebrates is expected following rewatering and typically occurs within two months (Cushman 1985; Thomas 1985; Harvey 1986). In addition, the effect of macroinvertebrate loss on juvenile salmonids is likely to be negligible because food from upstream sources (via drift) would be available downstream of the dewatered areas since stream flow, if present, will be bypassed around the project work site. Food sources derived from the riparian zone will not be affected by dewatering because vegetation not removed for construction will be kept alive with irrigation.

When stream flow is present, installation of the cofferdam/bypass pipe system or the temporary diversion channel for dewatering the work site will likely result in temporary changes to instream flow within and downstream of the construction site. These fluctuations in flow are anticipated to be small, gradual, and short-term (maximum 60 days). Once the actual dewatering system is installed, stream flow above and below the work site will be the same as free-flowing pre-project conditions except within the dewatered reach where stream flow is bypassed.

Rearing steelhead could be killed or injured if crushed by equipment or foot traffic during construction of the water bypass system and harm individual rearing juvenile steelhead by concentrating them in residual wetted areas. However, fish relocation efforts (described below) are expected to remove the majority of fish in the area and direct mortality is expected to be minimal. Fish that elude capture and remain in the project area during dewatering may die due to desiccation or thermal stress, or be crushed by equipment or foot traffic. NMFS expects that 1 percent of fish located within dewatered areas may evade capture, become stranded, and die in dewatered sites. Based on the juvenile density estimates described above and the amount of stream to be dewatered each year and cumulatively over the 5-year permit term, NMFS expects the following number of juvenile steelhead to become stranded and die as a result of dewatering:

Bank Stabilization

- up to 16 juvenile steelhead annually in up to 1200 lf or dewatered stream; and
- up to 32 juvenile steelhead over 5 years in up to 2400 lf of cumulative dewatered stream reaches.

Fisheries Enhancement

- up to 8 juvenile steelhead annually in up to 600 lf of dewatered stream; and
- up to 26 juvenile steelhead over 5 years in up to 2000 lf of cumulative dewatered stream reaches.

2.6. Cumulative Effects

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

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

2.6.1 **Rancho Canada Village Project**

The proposed project would develop an approximately 76-acre area within the former Rancho Cañada Golf Club in the lower Carmel River valley. The project site would be comprised of a mix of residential and recreational uses, including a 130-unit residential neighborhood and 40 acres of permanent open space and common areas within the 76-plus acres. The project would be built partially within the 100-year floodplain of the Carmel River (but not in the floodway). The project could alter the level and character of flood events upstream and downstream. However, based on the flood studies completed, with mitigation, the project would not have a significant impact on flooding. The new residences would have a demand for water infrastructure. However, the project would shift use of water from golf course irrigation to residential use, which will result in a reduced withdrawal of water from the Carmel River aquifer. This reduced withdrawal from the aquifer will also benefit biological resources in the area. The applicant has a contractual allocation of riparian water rights of 180 acre-feet per year (AFY). The SWRCB has approved a proposed water transfer of 60 acre-feet (AFY) of these water rights for use by Cal Am that would be used for other municipal uses. The project also includes a proposed 50 AF dedication of riparian water for instream uses which would also lower water usage and result in benefits to the Carmel River aquifer and associated biological resources.

2.6.2 **Pure Water Monterey Project and Alternative Water Supplies**

Pure Water Monterey (PWM) currently delivers about 3,500 acre-feet of water annually (AFY) to the local water supply, treating municipal wastewater, stormwater, etc. This has greatly reduced the demand for water from the Carmel River. Plans for a PWM expansion would add another 2,250 AFY in supply and projected to meet the needs for the Monterey Peninsula for another 30 years (MPWMD 2022). This is in large part due to the reduction in water supply demand from over 14,000 AFY in the early 2000's to the 5-year average demand from 2017-2021 of 9,725 AFY. This has largely been achieved through water conservation efforts and moratorium on new housing/development from the SWRCB Cease and Desist Order. The Monterey Peninsula has the lowest per capita water consumption of any comparable community in the State of California, approximately 58 gallons per person per day. These alternative water supplies and conservation measures 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 **SWRCB Cease and Desist Order on Carmel River Withdrawals**

In accordance with a 1995 SWRCB order and followed by WR 2016-0016, CalAm's legal right to Carmel River was only 3,376 acre-feet annually, just a fraction of the approximately 14,000 acre-feet it was pumping from the river at the time. This has come into effect as of January 2022 and has already contributed to less riverine dryback.

2.7 Integration and Synthesis

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

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). 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 and predation. However, the greatest threats to the S-CCC steelhead DPS populations are the degradation of habitats due to impassable dams, surface water withdrawals, and groundwater extractions (NMFS 2013). Natural environmental variation (floods and droughts) and climate change 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 large wildfires. 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 2016, NMFS 2023).

As described in the *Environmental Baseline* (Section 2.4), 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. 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). The current conditions within the action area are indicative of the DPS-wide conditions noted above and described more completely in *Status of the Species and Critical Habitat* (Section 2.2). 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.

There have been many efforts to restore habitat within the Carmel River watershed and mitigate for degradation caused from water withdrawals and other anthropogenic effects. As described in *Cumulative Effects* (Section 2.6), the enforcement of the SWRCB cease and desist order reduced

CalAm water withdrawals to their authorized limit for the first time in decades. The expansion of alternative water supplies, such as Pure Monterey Water, and several conservation measures enacted by MPWMD and CalAm have reduced overall demand of water from residences and businesses in the Monterey Peninsula. The planned conversion of a Carmel Valley golf course (Rancho Canada) to recreated floodplain habitat will periodically provide essential habitat that has been lost in the watershed. Rescues implemented by MPWMD and CRSA will continue to relocate steelhead from riverine reaches that are drying to reduce imminent risk of stranding and mortality of juvenile steelhead. Several studies using advance detection technologies are enhancing fisheries management knowledge and informing decisions on how to best recover steelhead and preserve the habitat they depend on in the Carmel River 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.

Climate change could affect S-CCC steelhead in the action area (Section 2.4.2). The predicted increase in summer temperatures could lead to reduced growth rates and lower survival for stream-rearing juveniles. Similarly, lower precipitation could lead to reduced stream flows, increased stream drying, and less food availability via invertebrate drift. Given the impaired habitat conditions across much of the action area (i.e., impaired water quality and low summer flows), NMFS does not expect conditions to worsen beyond those already occurring over the five-year term of the programmatic biological opinion. Short-term effects of climate change may exacerbate these conditions; however, the effects of climate change are not expected to significantly worsen existing conditions over the timeframe considered in this programmatic biological opinion.

NMFS considers all the potential effects of the project including beneficial, non-adverse or adverse impacts. The implementation of some Program activities along with several of the AMMs proposed are expected to reduce or eliminate accidental spills, sedimentation and turbidity or ensure reduction of riparian habitat is temporary and localized. In addition, limitations have been placed on the timing, spatial distribution, and magnitude of activities to further reduce the potential for adverse impacts. As a result, the potential for steelhead and their critical habitat to be exposed to construction debris, hazardous materials, and contaminants is improbable. Similarly, temporary reductions in riparian habitat or benthic food sources, and temporary increases in suspended sediment concentrations will not reach levels that are harmful to steelhead. Large wood from fallen trees will not be removed but cut and left in place whenever possible to provide habitat complexity in the river. Any riparian trees removed will be replaced at a ratio (3:1) per each tree removed. All disturbed areas will be replanted by native vegetation and will result in greater than 1:1 replacement of native vegetation. Effects to aquatic macroinvertebrates resulting from stream flow diversion and dewatering will be short-lived (maximum 60 days) and dewatered reaches will be small (less than 600 linear feet). MPWMD has proposed minimization measures to prevent or sufficiently reduce the discharge of sediment during and after construction to levels below those known to degrade habitat or alter the behavior of, injure, or kill steelhead. NMFS does not expect any of the aforementioned effects to occur simultaneously with other effects in any significant way. Additionally, several beneficial projects such as large woody debris placement and augmentation of spawning gravel will enhance PBFs of critical habitat. Therefore, Program effects expected from reduction in riparian vegetation and benthic food sources, or from increased sediment and turbidity are temporary and localized in nature and will not reduce survival of individual steelhead nor appreciably diminish the value of S-CCC steelhead designated critical habitat in the action area.

Altered channel morphology from bank stabilization has the potential to simplify stream habitats and directly lead to a reduction of individual fitness and habitat available to juvenile salmonids. AMMs and project limits on size, proximity, and project design will reduce the amount of hardscape and impacts to PBFs of steelhead critical habitat. However, the adverse impacts of ongoing channelization on critical habitat function will likely result from the Program. The localized nature of stream bank stabilization and its associated effects that will result from the Program over the next five years is not expected to appreciably diminish the value of S-CCC steelhead critical habitat as a whole for the conservation of the species.

Juveniles may be exposed and injured or killed by dewatering activities. Anticipated mortality from relocation is expected to be approximately two percent of juveniles relocated. Mortality from dewatering is expected to be approximately one percent of the juveniles in the area prior to dewatering. Therefore, a primary risk assessment is whether the loss of these individuals will reduce appreciably the likelihood of both the survival and recovery of S-CCC steelhead in the wild by reducing its numbers, reproduction, or distribution. Because no adults are expected to be harmed and due to the relatively large number of juveniles produced by each spawning pair, coupled with expected improvements in spawning due to easier access to habitat above the former SCD and the expected improvements to instream flow from water withdrawal reductions; steelhead spawning in the Carmel River watershed in future years are likely to produce enough juveniles to replace any that may be killed at the project sites due to relocation and dewatering. It is unlikely that the small potential loss of juveniles from the project would impact future adult returns in the Carmel Watershed. NMFS does not expect the project to impair the population, nor do we expect the project to affect the persistence or recovery of the S-CCC Steelhead DPS.

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

2.9.1 **Amount or Extent of Take**

NMFS has determined that incidental take associated with the dewatering and capture/relocation of juvenile steelhead is reasonably certain to occur. The extent and frequency of bank stabilization activities and the estimated steelhead densities calculated from the fall juvenile population surveys within the action area allow us to identify the maximum take that could occur under the programmatic. Take is expected to be in the form of capture for relocation, stranding due to construction site dewatering, and indirect injury or mortality during capture and relocation efforts or from degradation of habitat that occurs from bank stabilization projects.

NMFS anticipates the annual maximum amount of take of juvenile steelhead from the program will be limited to a small portion of the Carmel River steelhead population. NMFS also expects that bank stabilization projects will be variable from year to year, because historically more stabilization projects were needed in the years following high winter flows. Therefore, NMFS has established both annual and cumulative (approximately 5 years) take estimates. In the programmatic biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

Fisheries Enhancement Activities

- Over the 5-year permit-term, a maximum cumulative take of 2,600 juveniles from capture and relocation activates leading to injury or mortality of up to 78 juvenile steelhead.
- Annually, the average take would be 780 juveniles from capture and relocation leading to injury or mortality of up to 24 juvenile steelhead.

Bank Stabilization Projects

- Over the 5-year permit-term, a maximum cumulative take of 3,120 juveniles from capture and relocation activates leading to injury or mortality of up to 95 juvenile steelhead.
- Annually, the average take would be 1,560 juveniles from capture and relocation leading to injury or mortality of up to 48 juvenile steelhead.

Take will be exceeded if either the annual or cumulative take estimates for each project type are exceeded.

NMFS anticipates that the bank stabilization projects will harm juvenile S-CCC steelhead by degrading habitat quality. In this circumstance, NMFS cannot accurately estimate an amount of take that would be caused by the Program. In instances such as this, NMFS designates the expected level of take in terms of the extent of take anticipated. Here, the best available indicator for the extent of take is related to the area of habitat lost due to streambank RSP armoring at project sites. This variable is directly proportional to the extent and nature of harm attributable to these projects. Therefore, for harm associated with permanent placement of RSP along Carmel River, the linear length of streambank covered by RSP or other “hard” methods will serve as an effective take indicator. Specifically, the anticipated take will be exceeded if the total distance of the RSP placement is longer than 240 linear feet annually or cumulatively over 5 years, more than 480 linear feet. Likewise, anticipated take will be exceeded if the total amount of slope protection projects exceeds 1,200 linear feet annually and cumulatively over the term of the Program, more than 2,400 linear feet. This take indicator operates as an effective reinitiation trigger because the Corps has authority to conduct compliance inspections and to take actions to address noncompliance, including post-construction (33 CFR 326.4).

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" refer to those actions the Director considers necessary or appropriate to minimize the impact of the incidental take on the species (50 CFR 402.02).

NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of S-CCC steelhead:

1. Undertake measures to ensure that harm and mortality to S-CCC steelhead resulting from fish relocation and dewatering activities are low.

2. Measures shall be taken to protect essential habitat features on steelhead streams during all proposed programmatic activities.

3. Minimize incidental take caused by the bank stabilization projects by ensuring riparian plantings survive and successfully revegetate the streambank.

4. Ensure completion of a monitoring and reporting program to confirm that the take is not exceeded, and that the terms and conditions in this incidental take statement are effective in minimizing incidental take.

2.9.4 **Terms and Conditions**

In order to be exempt from the prohibitions of section 9 of the ESA, the federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. The Corps 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) The following terms and conditions implement reasonable and prudent measure 1:

a) The Corps, the applicant, or their consultant, will ensure a qualified biologist with expertise in the areas of anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid/habitat relationships; and biological monitoring of salmonids is available to conduct and oversee fish exclusion, capture and relocation activities. The Corps, the applicant, or their consultant, will ensure that all biologists working on the project are qualified to identify steelhead and conduct fish collections in a manner which minimizes all potential risks to steelhead.

b) Any steelhead captured will be handled with extreme care and kept in water to the maximum extent possible during relocation activities. All captured steelhead must be kept in cool, shaded, and aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream, and steelhead will not be removed from this water expect when released. To avoid predation, the biologists will have at least two containers and segregate small, or young, juveniles from larger, or older age- classes, and other potential predators. Captured steelhead will be relocated as soon as possible downstream of (i.e., towards the lagoon's main embayment) the pipeline crossing.

c) If any steelhead are found dead or injured, the biologists will contact NMFS biologist, Yvette Redler by email yvette.redler-medina@noaa.gov or phone immediately at (916) 539-7066 or the NMFS Central Coast Office (Santa Cruz, California) at (707) 575-6050. The purpose of the contact is to review the activities resulting in take, determine if additional protective measures are required, and to ensure appropriate collection and transfer of steelhead mortalities and tissue samples. All steelhead mortalities will be retained. Tissue samples are to be acquired from each salmonid mortality per the methods identified in the NMFS Southwest Fisheries Science Center Genetic Repository protocols (contact the above NMFS staff for directions) and sent to: NOAA Coastal California Genetic Repository; Southwest Fisheries Science Center; 110 McAllister Way; Santa Cruz, California 95060.

d) The steelhead mortalities (following acquisition of genetic sample material) are to be retained, placed in an appropriately-sized sealable plastic bag, labeled with the date and location of collection, and fork length, and be frozen as soon as possible. Frozen steelhead mortalities will be retained by the biological monitor until specific instructions are provided by the NMFS contact named above. Tissue samples are to be stored at ambient temperature. The biological monitor may not transfer steelhead mortalities to anyone other than the NMFS contact named above without obtaining prior written approval from NMFS' Central Coast Branch Supervisor. Any such transfer will be subject to such conditions as NMFS deems appropriate.

2) The following terms and conditions implement reasonable and prudent measure 2:

a) A worker education program shall be developed and implemented for MPWMD's employees and contractors working at the project sites. The goal of the education program shall be to educate MPWMD's employees and contractors on the potential for steelhead in project areas, how they should respond if they encounter steelhead, and the importance of protecting stream habitat. Employees shall receive instruction regarding construction impact minimization methods, including all appropriate conservation measures, and the Terms and Conditions presented in this Incidental Take Statement.

3) The following terms and conditions implement reasonable and prudent measure 3:

   a) Vegetation monitoring reports are required for the first three years following any slope protection project.
      i) The vegetation monitoring report should include the following:
         (1) Project identification
            (a) Permittee name, permit number, and project name.
            (b) Corps contact person.
            (c) Starting and ending dates of monitoring survey completed.
         (2) Vegetation condition.
            (a) Photos of streambank vegetation area conditions at the project site before, during, and after project completion. Include general views and close-ups showing details of the project and project area.
            (b) Label each photo with date, time, project name, photographer's name, and a comment about the subject.
         (3) Vegetation monitoring data:
            (a) Dead or dying trees identified during vegetation monitoring survey will be removed and replanted to ensure at least 70% survival of vegetation plantings. Identify the number of dead or dying plants removed and replaced to ensure 70% survival.
            (b) Brief discussion about height and condition of the planted vegetation and contribution to replacement of lost functions (improved forage and natural cover) at the site.
            (c) Vegetation monitoring reports must be submitted to NMFS annually by February 1st to yvette.redler-medina@noaa.gov

4) The following terms and conditions implement reasonable and prudent measure 4:

   a) The permittee must submit an implementation monitoring report to NMFS within 30 days of completing all construction work. The monitoring report will include the following information:
      i) Project Identification.
         (1) Permittee name, permit number, and project name.
         (2) Project location by sixth-field HUC or by latitude and longitude as determined from the appropriate United States Geological Survey 7-minute quadrangle map.
         (3) Corps contact person.
      ii) Habitat Conditions.
         (1) Photos of habitat conditions at the project site before, during, and after project completion and include linear feet affected.Include general views and close-ups showing details of the project and project area.
         (2) Include photos of the streambank contouring operations for the RSP construction. Label each photo with date, time, project name, photographer's name, and a comment about the subject.

iii) Project data.
   (1) Number of days it takes to complete the revetment construction.
   (2) Total linear length of the new revetment.
   (3) Width of rock placement.
   (4) The number and type of any rootwads placed in the revetment, or any other structures designed to minimize habitat degradation.

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). NMFS has no conservation recommendations at this time.

2.11 Reinitiation of Consultation

This concludes formal consultation for the Carmel River Stream Maintenance Program.Under 50 CFR 402.16(a): "Reinitiation of consultation is required and shall be requested by the federal agency, where discretionary federal involvement or control over the action has been retained or is authorized by law and: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action."

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

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

3.1 EFH Affected by the Proposed Action

EFH managed under the Pacific Groundfish Fishery Management Plan (PFMC 2005) may be adversely affected by the project. Project construction will be limited to a relatively small portion of tidally influenced areas, if any at all. Areas of the Carmel Lagoon are known to support Pacific Groundfish species such as Starry Flounder *(Platichthys stellatus).* The lagoon is also designated as a Habitat Area of Particular Concern (HAPC). HAPCs are described in the regulations as subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. Designated HAPCs are not afforded any additional regulatory protection under MSA; however, federal projects that may adversely affect HAPC are more carefully scrutinized during the consultation process.

3.2 Adverse Effects on EFH

The potential adverse effects of the project on EFH have been described in the preceding Programmatic Biological Opinion. To summarize, the project will result in streambank vegetation modification, wood removal, increases in turbidity from construction, potential introduction of toxins from heavy machinery, hardening of streambanks, and stream channel dewatering of work sites. However, the program will implement numerous minimization measures aimed at retaining habitat value in all project areas, will include revegetation of all disturbed areas, and proposes other measures to avoid or minimize potential adverse effects to EFH. Therefore, NMFS has no additional EFH conservation recommendations to provide at this time. This concludes the EFH consultation.

3.3 Supplemental Consultation

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

4 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the Corps. Other interested users could include the MPWMD. Individual copies of this opinion were provided to the Corps. The document will be available within 2 weeks at the NOAA Library

Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adhere to conventional standards for style.

4.2 Integrity

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

4.3 Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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