**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

**May 23, 2012**

In response refer to:
2011/06032

Lieutenant Colonel Torrey A. DiCiro
Department of the Army
San Francisco District
U.S. Army Corps of Engineers
1455 Market Street
San Francisco, California 94103-1398

Dear Colonel DiCiro:

Thank you for your letter of August 21, 2011, requesting informal consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*), for the California American Water Company's (CAW) proposed Los Padres Dam Downstream Fish Passage Facility Project located at Los Padres Dam on the Carmel River, near the town of Carmel Valley, Monterey County, California.

The enclosed biological opinion is based on our review of CAW's project and describes NMFS' analysis of the potential effects on threatened South-Central California Coast (S-CCC) steelhead (*Oncorhynchus mykiss*) Distinct Population Segment and their designated critical habitat in accordance with section 7 of the ESA. Threatened steelhead are present in the project's area, and the Carmel River is designated critical habitat for the species. In this opinion, NMFS concludes that the proposed project will not jeopardize the continued existence of S-CCC steelhead, nor adversely modify or destroy their critical habitat. However, NMFS expects activities occurring during construction of this project are likely to result in take of S-CCC steelhead and, therefore, an incidental take statement is enclosed with this biological opinion.

Please contact Ms. Jacqueline Meyer of the North Central Coast Office at (707) 575-6057, or via electronic mail at Jacqueline.pearson-meyer@noaa.gov, if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

For Rodney R. McInnis
Regional Administrator

Enclosure

cc: Chris Yates, NMFS, Long Beach
Paula Gill, USACE, San Francisco
Copy to Administrative file: 151422SWR2011SR0059

**Enclosure 1**

# BIOLOGICAL OPINION

| | |
|---|---|
| **ACTION AGENCY:** | U.S. Army Corps of Engineers, San Francisco District |
| **ACTION:** | Construction of the California American Water Company's Los Padres Dam Downstream Fish Passage Facility at the Los Padres Dam on the Carmel River |
| **CONSULTATION CONDUCTED BY:** | National Oceanic and Atmospheric Administration's National Marine Fisheries Service, Southwest Region, North Central Coast Office |
| **TRACKING NUMBER:** | 2011/06032 |
| **DATE ISSUED:** | **May 23, 2012** |

## I. CONSULTATION HISTORY

The Los Padres Dam is a known fish passage impediment for downstream migrating South-Central California Coast (S-CCC) steelhead Distinct Population Segment (DPS). The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) has worked with the California American Water Company (CAW), the United States Fish and Wildlife Service (USFWS), the California Department of Fish and Game (CDFG), and Monterey Peninsula Water Management District (MPWMD) since 2009 to consider a range of alternatives to address downstream juvenile fish passage at Los Padres Dam. By agreement between the CDFG and NMFS Engineering Teams, CDFG has taken the lead role in the development and review of the facility to ensure that it met both CDFG and NMFS fish passage requirements. As a result of this agency and stakeholder involvement, an interim fish passage solution was identified. NMFS and other key proponents participated in bi-weekly, monthly, then quarterly meetings with CAW to help refine the fish passage structure design.

Following advancements in the design of the fish passage structure, the United States Army Corps of Engineers (Corps) held interagency coordination meetings with NMFS, USFWS, CDFG, and MPWMD to review the final fish passage designs and operational plans. The key decisions of these meetings are provided below:

On November 10, 2010, the Corps stated that Los Padres Reservoir is not a "navigable water" as defined in Section 10 of the Rivers and Harbors Act, therefore, permitting for this project would be processed under the Clean Water Act (CWA) Section 404 using Nationwide Permit (NWP) 27, *Aquatic Habitat Restoration, Establishment, and Enhancement Activities*.

At a meeting on December 16, 2010, NMFS and CDFG identified juvenile fish passage as being the highest priority for this project. Although it was decided that the floating surface collector design should include flexibility to trap and haul fish should unexpected mortality occur, it was also determined that fish trapping should not be part of the proposed action.[1] Kelts, the relevant lifestage, should simply be allowed to pass through the bypass conduit passively. During this meeting and the discussion regarding fish passage criteria necessary to pass kelts through the system, NMFS asked for consideration of recirculation pumping of the water from the tailrace to the forebay to increase water flow in the bypass pipe. It was also recommended that the pipe transporting fish downstream from the surface collector should be as straight as possible (alignment number 2 from the design alternatives is preferred per HDR 2009). Additional recommendations were made for the design of the facility, specifically, the flume adjustments should be automatic and not require recurring operation by CAW staff; and the fish passage system should be designed to last at least 10 years.

On January 12, 2011, the design for the bypass pipe changed to discharge into the existing fish ladder. This feature was changed in order to avoid operational issues associated with the previous adjustable height flume and provide a static outfall height of less than 4 feet. The outfall location was changed not to include the fish ladder due to operational concerns of the fish ladder with additional flow from the bypass pipe. It was determined that the surface collector design would allow for pumping of downstream water into the bypass pipe. However, pumping is not proposed, considered, or evaluated as part of the proposed action.

A site visit was conducted on March 30, 2011, by staff from CDFG, CAW, HDR Engineering (HDR, contracted by CAW), and MPWMD to determine the appropriate alignment of the bypass pipe and outfall location. A subsequent visit was required on May 4, 2011, at which time MPWMD staff took depth and velocity measurements and transmitted the data to CDFG for discussion and approval of the outfall location. A final location was agreed upon by the staff at HDR, CAW, MPWMD, and CDFG. It was determined that locating the outfall at the agreed-upon transect, and orienting it downstream would provide adequate depth and favorable velocities over the greatest window of downstream migration (thus most closely matching NMFS' outfall criteria) while avoiding the structural and debris concerns of placing the outfall in the peak velocities of the thalweg. This placement was agreed upon as the best practical alternative available in the receiving pool below the dam.

NMFS staff has had several meetings (quarterly), phone conversations, electronic mail (e-mail) and information exchanges with CAW, HDR and pertinent regulatory agency personnel regarding the design, development and implementation of the fish passage facility since January 2011. The information regarding the geotechnical studies of the site and pile installation requirements were provided to NMFS via e-mail on August 10, 2011. Final comments on the 90 percent design were submitted by CDFG on October 30, 2011. NMFS determined all of the required information necessary to complete the consultation was provided. However, in October

[1] See the discussion on page 7 regarding any future use of the fish collector for the trapping of fish.

of 2011, the Division of Safety of Dams (DSOD) raised concerns regarding the flood criteria model used for design of the fish passage structure. The DSOD requested CAW and their project consultants apply a different model and address potential dam safety concerns. This request posed a significant delay in moving forward with the project. Therefore, on November 1, 2011, NMFS sent a letter to the DSOD regarding the importance of this project for steelhead, and requested the DSOD not delay the implementation of the project in light of their recent safety concerns which should be considered a separate matter from improving fish passage at the site. NMFS received a letter from the DSOD dated November 21, 2011, stating that they had to have assurances from CAW that the project would not pose a risk to the dam or flooding, and would make attempts not to delay the project. If DSOD requires changes be made to the project that affects listed species or critical habitat in the action area, re-initiation of this consultation is required. NMFS initiated consultation on this project October 30, 2011.

## II. DESCRIPTION OF THE PROPOSED ACTION

The Corps proposed to grant a permit, pursuant to Section 404 of the Clean Water Act (33 U.S.C. Section 1344), to CAW. CAW is requesting this permit authorization to construct a downstream fish passage facility at Los Padres Dam (Figure 1), on the Carmel River, near the town of Carmel Valley, Monterey County, California. The Corps proposes authorizing the placement of fill in waters of the U.S. resulting from the proposed construction of a facility designed to collect and pass downstream-migrating S-CCC juvenile and kelt steelhead. The proposed downstream fish passage facility is designed to provide Endangered Species Act (ESA)-listed adult and juvenile steelhead safer passage downstream than currently exists. The proposed downstream fish passage facility is scheduled to be built between July 1 and November 1 for one season in either 2012 or 2013. NMFS does not anticipate any interrelated or interdependent actions associated with the proposed action.

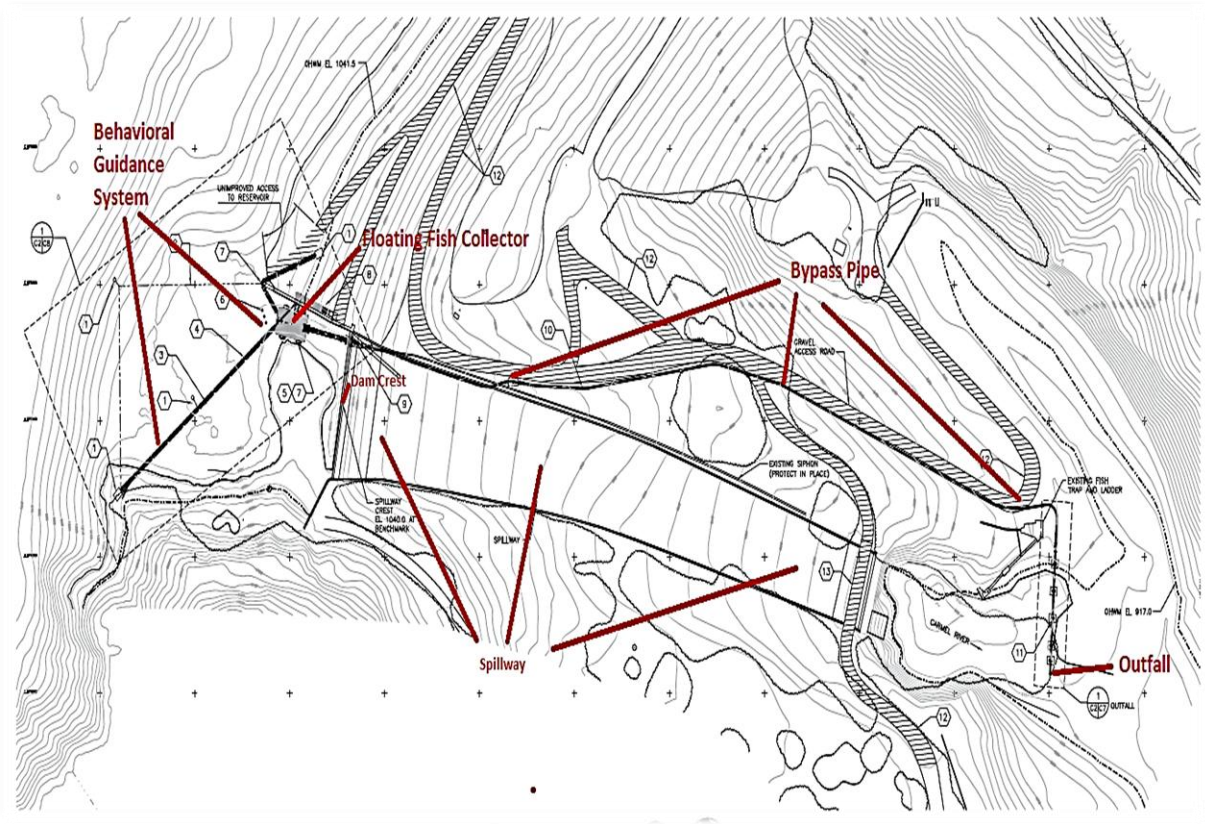


**Figure 1. Los Padres Dam Fish Passage Facility (HDR 2012)**

## A. Proposed Construction Activities and Structural Components of the Fish Passage Facility

The proposed downstream fish passage facility will be located in the reservoir immediately upstream of the spillway of Los Padres Dam. The proposed facility will be composed of a behavioral guidance system, floating surface collector, fish bypass conduit, and an outfall structure located downstream of the reservoir.

Construction of the fish passage structure will require equipment access in and around the reservoir, streambank manipulation, minor excavation, riparian vegetation removal, fish capture and relocation, and installation of piles either through impact hammering, drilled shaft technique or grouted and anchored to a concrete pad. All work will be contained and/or isolated from the reservoir or the Carmel River, including pile driving. Staging and lay down areas for the work will occur in the barren area west of the dam.

As proposed, out-migrating steelhead would be guided to the collector inlet via the behavioral guidance system. Once in the collector, the fish would be routed into the fish bypass conduit

where they would travel to the outfall structure connecting to the Carmel River below the spillway. The expectation is that the facility will improve passage and survival of downstream migrating steelhead, thereby increasing productivity that is currently limited by passage and other issues described below in the Environmental Baseline. Construction activities and components of the facility are detailed below.

1. Behavioral Guidance System

The behavioral guidance system (BGS) will be composed of a series of floating panels constructed of steel, aluminum, or high density plastic. The solid panels will be connected to one another, and floats, and extend approximately 8 to 10-feet deep in the water column or with a maximum depth extension equal to one third the depth of the depth of the reservoir. Gaps between panels will be 3-inches or less, and would be separated by rubber gaskets or brushes. The BGS would extend across the forebay and be anchored as near as possible to the shore to contain the greatest degree of the forebay area. The BGS will be anchored using one 12-inch steel pipe pile and large (5-feet wide by 5-feet deep by 10-feet tall) concrete blocks placed on the reservoir substrate or rock anchor drilled into the bedrock slope. The support boom will be connected to the blocks or rock anchors to hold it in place. The proposed system is designed to withstand a 100-year flood event.

A separate debris boom will be installed on the upstream side of the BGS to intercept debris and minimize it entering the floating weir surface collector. The debris boom will also have a concrete block the same size as the anchors for the BGS which will be placed on the reservoir substrate. CAW will manage debris build up at the debris boom according to their existing debris management protocols. Where possible, CAW will allow woody debris to remain floating behind the debris boom until it sinks to the bed of the reservoir to provide for aquatic habitat complexity. During periods of flood and extreme debris build up, the debris boom and BGS boom would be disconnected to allow debris to pass over the dam with flood waters.

2. Floating Surface Collector

The floating surface collector will be attached to the BGS. The collector will be located near the western shore of the existing abutment wall immediately upstream of the dam spillway and will be anchored in place using four 18-inch diameter steel pipe piles. Additional piles may be installed (up to six, 12-inch diameter piles) to provide protection from floating surface debris and used to anchor the debris boom described above. CAW will install all the piles during a period of the lowest annual reservoir levels, or dry conditions.

The methods of piling installation will be based upon data in the geotechnical investigation. Preliminary evaluation of the site indicates presence of fractured bedrock at the location of the piles. If piles are driven with an impact hammer, a maximum of two piles would be installed per day, requiring an estimated 100 strikes per pile (because of the low number of piles, it is likely that only one pile would be driven per day; however, we use a conservative approach throughout and evaluate the effects of 2 piles being driven per day.). A bubble-curtain or other sound

attenuation method will be used to minimize sound pressure levels during pile driving, if piles are driven in the water (*i.e.*, no dewatering has occurred). The water surface elevation of the reservoir is approximately 1006.60 feet and has been recorded as high as 1042.95 feet. The bottom of the reservoir is at an elevation of approximately 960 feet, therefore water depths in the reservoir are between 46.6 up to 82.95 feet deep. Based on past water levels in the action area during this time of year, water depths during pile driving for the project could be up to 26.6 feet deep, but is expected to be lower or dry in the areas where construction will occur.

While pile driving is the preferred technique because it would result in the smallest footprint and lowest construction costs, it may not be feasible to drive piling into the hard substrate at the exact tolerance needed for the collector to operate. Under this scenario, CAW will either utilize drilled shaft technique or installing a concrete pad in the forebay to support the piles. Drilled shafts would be installed within a dewatered cofferdam designed to isolate the work area from the reservoir. The piling would then be inserted in the drilled shaft and held in place with grout. Drilling the piles into the substrate is the most likely method to occur for this project. The final alternative would be to pour a concrete slab in place along the bed of reservoir. The slab would be held in place by rock anchors drilled into the underlying bedrock. The slab would then function as a foundation for the surface collector piles to be attached.

The surface collector would be floated using ballast tanks that allow the structure to move up and down along the piles with the changing reservoir surface elevation, keeping the inlet of the collector device a minimum of two feet below the water surface. This estimated range of movement is based on water surface elevation data for the spillway forebay. As proposed, the water flow rate (fish capture velocity) entering the floating weir surface collector structure would normally range from 4 to 20 cubic-feet-per-second (cfs) to match the capacity of the bypass conduit, though provisions are being made to allow for up to 30 cfs in the future to allow for the creation of a false attraction (fish attraction cues) through the use of pumps. If the system is ever configured this way, the excess water would be discharged downstream of the BGS (although it is anticipated for the structure to function with flows between 4 to 20 cfs during most years, and this consultation considers the potential ranges of 4-30 cfs).

Although, if enabled, the design of the floating surface collector would make it possible for the collector to trap fish, this design feature will not be enabled; therefore, the collector will not be used to trap fish. CAW does not propose to trap fish, and trapping is not reasonably certain to occur. Accordingly, use of the collector to trap fish has not been analyzed under this consultation and no incidental take is allowed. Any use of the system to trap fish should be addressed through the appropriate Endangered Species Act regulatory process. Specifically, if CAW wishes to modify the action presented by using the fish collector to trap fish, re-initiation would be required.

The inlet of the collector will have an entrance that extends two feet below the bottom of the collector and a panel attached to it that extends another three feet below the inlet, for a total of five feet. The collector will be designed to work in concert with the BGS, and thus under the same flow conditions. Additionally, the collector intake will have a minimum water velocity of

4 feet per second (fps) for juveniles, and 8 fps for adults *(i.e.,* kelts). The width of the proposed collector inlet will be eight feet, narrowing to four feet within the collector. The collector is designed to operate up to a maximum spillway flow of 1,100 cfs. For flows above that level the collector will be closed to prevent damage to the system and for safety. Additionally, the collector will be equipped with two shutoff valves to isolate the collector and stop flow from passing through the bypass conduit, one upstream of the flexible pipe connection in the collector to the point of penetration through the ogee[2] of the spillway; and one in the concrete access structure just downstream of the point where the bypass conduit would pass through the abutment wall near the top of the spillway. At flows above 1,100 cfs, when flow is no longer entering the collector, fish may pass downstream via the spillway.

3. Bypass Conduit and Outfall

The bypass conduit is the pipe that will transport steelhead from the floating weir surface collector around the spillway and outfall and then into the Carmel River below the dam. The bypass conduit will be composed of different segments of 18-inch pipe designed for gravity flow with a normal range capacity of between 4 and 20 cfs, but may operate up to 30 cfs. The upper and lower limits on the range of flow were established by the careful evaluation of fish transport criteria established by CDFG for this project versus tradeoffs of achievable transit times, practical cost limitations as well as site characteristics and constraints. The conduit segment between the floating weir surface collector and the face of the spillway will be composed of high-density polyethylene (HDPE) pipe supported by a steel truss, allowing the conduit to be suspended in the water column. The second segment will be cored through the existing spillway and would be epoxy-lined ductile iron pipe, which would be grouted into place. The remaining segments will be HDPE installed both below and above grade. The selection of the pipe materials is based on providing a smooth interior surface with joints designed to minimize turbulence and debris accumulation.

The bypass conduit will follow the east side of the dam access road and be buried for the majority of its length at a depth of up to five feet below existing ground level. At the top end of the bypass conduit, just after it penetrates the spillway and abutment wall, the conduit will be located approximately 12 feet below the existing ground level but will transition to an approximate five feet depth with approximately 50 feet of linear conduit length. A concrete access structure will be constructed in this location to allow pipe access and a viewing port at this location.

The alignment of the bypass conduit will be down the face of the dam embankment. The bypass conduit will discharge into the Carmel River approximately 900 feet downstream of the collector. The water velocity within the bypass conduit will always be at least 2 fps with a minimum depth of at least one-half foot during the annual steelhead migration period (December - June).

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[2] An ogee spillway is a physical component of some dams. It is an overflow weir in which the cross section of the crest, downstream slope, and bucket have an "S" or ogee form of curve.

The bypass outfall will be located downstream of the spillway and Bailey Bridge and is designed to conform with *NMFS Criteria for the Passage and Release of Anadromous Salmonids* (NMFS 1997). The exit point of the outfall will be set to where it is a minimum of two feet and a maximum of four feet above the tailwater surface elevation expected during the migration period. Approximately 30 square-feet ($ft^2$) of permanent fill (concrete) will occur below the ordinary high water mark in the river to construct the outfall supports (see Figure 1). However, the support footings will be buried below the river substrate once construction is completed. The substrate of the tailwater pool ranges from large boulders and cobbles to small gravel and silts. Additionally, a breakaway or sacrificial final segment of the outfall may be added to address high flows. However, if the terminal or other sections of the outfall pipe or supports are damaged, CAW will provide for prompt replacement of the pieces so that the remainder of the downstream passage season will not be compromised.

4. Fish Capture and Relocation

In-water work is anticipated to occur during times of year when few ESA-listed steelhead could be in the vicinity, but numbers are expected to be very low if fish are present at all. Therefore, fish relocation may be required. When this occurs, a NMFS-approved fisheries biologist familiar with identification and handling of all life stages of listed steelhead will oversee fish capture and relocation activities.

5. Other Project Elements

Temporary improvements to the access road Bailey Bridge located at the base of the spillway will be required to allow construction equipment with materials to access the site. Temporary improvements may include the addition of a reinforced temporary deck composed of steel beams and plates over the top of the existing deck. No permanent bridge modifying construction or demolition are included as part of the project and no in-water work is anticipated as part of bridge reinforcement.

6. Operation and Maintenance

The facility will be a passive system that is designed to capture and pass fish downstream. Operational guidelines will be developed by HDR to direct CAW regarding the proper functioning of the fish passage facility; these guidelines will not affect the essential operation features to which the applicant has already committed *(e.g.*, design according to NMFS' fish passage guidelines, operation at 4-30 cfs, seasonal operation, clearance of debris, inspections) as described in the project description . The facility will be designed to pass fish when the water surface elevations are between 1038.3 feet and 1042.5 feet, which represent the 95 percent probability of exceedance and the 2-year event in this location respectively. This means the fish passage facility will be in operation during the entire downstream salmonid migration period (December - June) annually unless high flows are experienced (as described below). A floating debris boom will prevent debris from clogging the collector and potentially causing the facility to malfunction. The facility will be inspected by CAW staff on a weekly basis while in use.

During times of expected high flows, the BGS will be disconnected from the facility and pivoted downstream along the east bank where there is less flow and potential for damage.

The applicant's commitments regarding the operation and maintenance of the facility are part of the proposed action and will be incorporated into the permit; a violation of those commitments reported by NMFS to the Corps will constitute grounds for the Corps to reinitiate consultation or revoke the permit.

7. Minimization and Conservation Measures

The following are measures that will be taken as a part of the proposed action to minimize and avoid adverse effects to ESA-listed steelhead.

- The proposed facility is designed to NMFS (1997) criteria for fish passage.

- The project is designed to improve the general health and survival of downstream migrating adult and juvenile steelhead.

- CAW will inspect the facility in its entirety once per week. During the weekly facility inspections, CAW will ensure the components are properly functioning and meets the targeted flows and conditions to pass fish. CAW will conduct these inspections whenever the facility is in operation. If inspections indicate that the facility is not functioning properly *(e.g.*, the targeted flows and conditions to pass fish are not being achieved, fish passage is not occurring as designed or described in the BA), CAW will notify NMFS and CDFG and seek their advice. NMFS may direct CAW to take measures to fix the facility to ensure appropriate fish passage.

- In-water work will occur during times of year when steelhead numbers are expected to be very low if fish are present at all. Should fish relocation be required, NMFS-approved fisheries biologists familiar with identification and handling of all life stages of listed steelhead will oversee fish capture and relocation activities.

- Avoidance and minimization measures will be implemented for in-water work to install the piling to support the surface collector. These measures have been described above and include installing piles when fish have been relocated from the area, isolating the work area where possible from the water column, and incorporating underwater sound attenuation methods such as bubble curtains.

- In-water or above-water work will be contained to prevent accidental discharge of construction-related debris or material from entering the Carmel River or Los Padres Reservoir.

- The staging and lay down area will have standard Best Management Practices (BMPs) incorporated to contain and prevent accidental leakage of construction material into the reservoir or the Carmel River.

### B. Action Area

The action area is defined as all areas affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). For the Los Padres Dam Downstream Fish Passage Facility Project, the action area is defined as the Los Padres Dam and Reservoir, located on the Carmel River at river mile (RM) 24.8. This area includes the banks and channel of the Carmel River and reservoir upstream of the dam for a distance of approximately 2070 feet[3], and downstream of the dam for a distance of 1000 feet.

## III. ANALYTICAL FRAMEWORK

### A. Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the Status of the Species, which evaluates the S-CCC steelhead DPS's range-wide conditions, the factors responsible for that condition, and the species' likelihood of both survival and recovery; (2) the Environmental Baseline, which evaluates the condition of this listed species in the action area, the factors responsible for that condition, and the relationship of the action area to the likelihood of both survival and recovery of this listed species; (3) the Effects of the Action, which determines the direct and indirect effects of the proposed Federal action and the effects of any interrelated or interdependent activities on this species in the action area; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on this species.

The jeopardy determination is made by adding the effects of the proposed Federal action and any Cumulative Effects to the Environmental Baseline and then determining if the resulting changes in species status in the action area are likely to cause an appreciable reduction in the likelihood of both the survival and recovery of this listed species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on the range-wide likelihood of both survival and recovery of this listed species and the role of the action area in the survival and recovery of this listed species. The significance of the effects of the proposed Federal action is considered in this context, taken together with cumulative effects, for purposes of making the jeopardy determination. We use a hierarchical approach that focuses first on whether or not the effects on salmonids in the action area will impact their respective population. If the population will be impacted, we assess whether this impact is likely to affect the ability of the population to support the survival and recovery of the S-CCC steelhead DPS.

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[3] Corresponding to the distance sound may travel upstream during pile driving.

## B. Adverse Modification Determination

This biological opinion does not rely on the regulatory definition of destruction or adverse modification of critical habitat at 50 CFR 402.02.[4] Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

The adverse modification analysis in this Biological Opinion relies on four components: (1) the Status of Critical Habitat, which evaluates the range-wide condition of critical habitat for the S-CCC steelhead DPS in terms of primary constituent elements (PCEs – sites for salmonid spawning, rearing, and migration), the factors responsible for that condition, and the intended conservation value of the critical habitat overall; (2) the Environmental Baseline, which evaluates the condition of critical habitat in the action area, the factors responsible for that condition, and the conservation value of the critical habitat in the action area; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs in the action area and how that will influence the conservation value of affected critical habitat units; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the conservation value of affected critical habitat units.

For purposes of the adverse modification determination, we add the effects of the proposed Federal action on S-CCC steelhead DPS critical habitat in the action area, and any Cumulative Effects, to the Environmental Baseline and then determine if the resulting changes to the conservation value of critical habitat in the action area are likely to cause an appreciable reduction in the conservation value of critical habitat range-wide. If the proposed action will negatively affect PCEs of critical habitat in the action area we then assess whether or not this reduction will impact the value of the DPS's critical habitat designation as a whole.

## C. Use of Best Available Scientific and Commercial Information

To conduct the assessment, NMFS examined an extensive amount of information from a variety of sources. Detailed background information on the biology and status of the listed species and critical habitat has been published in a number of documents including peer reviewed scientific journals, primary reference materials, and governmental and non-governmental reports. Additional information regarding the effects of the project's actions on the listed species in question, their anticipated response to these actions, and the environmental consequences of the actions as a whole was formulated from the aforementioned resources, the biological assessment for this project, and project meeting notes if applicable. Information was also provided in meetings, e-mail messages, site visits, and telephone conversations between October 2010 and November 2011. For information that has been taken directly from published, citable documents, those citations have been referenced in the text and listed at the end of this document. A complete administrative record of this consultation is on file at NMFS' North Central Coast Office (Administrative Record Number 151422SWR2011SR00597).

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[4] This regulatory definition has been invalidated by Federal Courts.

## IV. STATUS OF THE SPECIES AND CRITICAL HABITAT

This biological opinion analyzes the effects of the CAW Los Padres Dam Downstream Fish Passage Facility Project on the following Pacific salmonids and critical habitat:

- **S-CCC steelhead (*Oncorhynchus mykiss*) DPS**
  Threatened (January 5, 2006; 71 FR 5248)
  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 5248) in northern Santa Barbara County, California. This DPS does not include any artificially propagated steelhead stocks residing within the historical geographic range of the S-CCC steelhead DPS.

### A. Species Life History and Population Dynamics

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 (Meehan and Bjornn 1991, Shirvell 1990). 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 45-58 degrees Fahrenheit (˚F) and have an upper lethal limit of 75 ˚F (Barnhart 1986, Bjornn and Reiser 1991). They can survive in water up to 80.6 ˚F with saturated dissolved oxygen conditions and a plentiful food supply. Fluctuating diurnal water temperatures also aid in survivability of salmonids (Busby *et al.* 1996).

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

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

**B. Status of S-CCC Steelhead DPS**

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

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

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

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

Although steelhead are present in most streams in the S-CCC DPS (Good *et al*. 2005), their populations are small, fragmented, and unstable, or more vulnerable to stochastic events (NMFS 2006a). 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 originally listed S-CCC steelhead as threatened under the ESA on August 18, 1997, and reaffirmed the listing of S-CCC steelhead as threatened under the ESA on January 5, 2006 (71 FR 834). In the 2008/09 and 2009/10 winters, adult returns in many streams within the DPS were considerably reduced relative to higher returns at the beginning of the decade. This was likely attributed largely to poor ocean conditions along the eastern Pacific Ocean (Lindley *et al.* 2009). However, during the winter of 2010/11, adult returns appeared to rebound toward the low numbers seen at the beginning of the decade, based on a significant increase in adult returns counted at San Clemente Dam on the Carmel River[5], and a notable increase in the number of observed adults in Uvas Creek of the Pajaro Watershed (Jon Ambrose, NMFS, pers. comm. August 2011).

Further detailed information on this steelhead DPS is available in the NMFS' Status Review of West Coast Steelhead from Washington, Idaho, Oregon, and California (Busby *et al.* 1996), the NMFS' final rule for listing steelhead (62 FR 43937), and the NMFS' Status Review for Klamath Mountains Province Steelhead (Busby *et al.* 1996). Additional information is available from NMFS' Southwest Fisheries Science Center (SWFSC). The SWFSC has prepared several reports specifically for recovery planning that provide: 1) characterization of the S-CCC steelhead DPS historical population structure; 2) draft viability criteria for recovery; 3) assessment of threats; and 4) recommendations for recovery of the highest priority populations (NMFS 2006a; NMFS 2006b; NMFS 2007). The most recent status update concludes that steelhead in the S-CCC steelhead DPS remain "likely to become endangered in the foreseeable future" (Williams *et al.* 2011), as new and additional information available since Good *et al.* (2005) does not appear to suggest a change in extinction risk. On May 20, 2011, NMFS chose to maintain the threatened status of the S-CCC steelhead DPS (75 FR 13082).

## C. Status of Critical Habitat

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.

PCEs of S-CCC steelhead critical habitat include sites essential to support one or more of the life stages of the DPS (*i.e*., sites for spawning, rearing, migration, and foraging) and, specific PCE's for S-CCC steelhead are enumerated in 50 C.F.R.§ 226.211 (c) . These sites in turn contain physical or biological features essential to the conservation of the DPS (for example, adequate

[5] http://www.mpwmd.dst.ca.us/fishcounter/fishcounter.htm

flows for migration, spawning gravels, water quality and quantity, side channels, forage species).

The coastal drainages used by the S-CCC steelhead DPS provide relatively high productivity of the freshwater rearing PCE, maintain connectivity, and result in a wide distribution of the species. Inland HSAs provide important freshwater migration, freshwater spawning, and freshwater rearing PCEs unique within the inland ecotype. However, most areas of critical habitat have been degraded compared to conditions that once supported thriving populations of steelhead.

Most of S-CCC steelhead critical habitat has experienced 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; 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 large woody debris (Good *et. al* 2005, Hunt and Associates 2008, Boughton 2010, NMFS 2011, Williams *et. al* 2011).

## D. Factors Responsible for the Decline of S-CCC Steelhead DPS and Degradation of S-CCC Critical Habitat

Of the watersheds in the S-CCC steelhead DPS historically supporting steelhead, most continue to support runs, although run sizes are significantly reduced, or no longer exist in many sub-watersheds. A reduced population size causes each individual within the population to be more important and significantly increases the susceptibility to small or catastrophic events. Moreover, low population sizes compromise genetic integrity, posing serious risks to steelhead survival and recovery. As mentioned previously, the four largest watersheds (Pajaro, Salinas, Nacimiento/Arroyo Seco, and Carmel rivers) have experienced declines in run sizes of 90% 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 because of the loss, degradation, simplification, and fragmentation of habitat associated with anthropogenic activities such as agriculture, mining, and urbanization (Hunt & Associates 2008), and from environmental factors such as ocean conditions, reduced marine derived transport and to some degree disease and predation.

### 1. Anthropogenic Factors

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 S-CCC steelhead is the loss or decrease in quality and function of essential habitat features (*i.e.*, PCEs). 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) (Chapman and Bjornn 1969, Bergren and Filardo 1993, 61 FR 56138, NMFS 2006a, 2007), ranching, recreation, urbanization, loss of estuarine habitat,

(wetland and riparian areas, roads, grazing, gravel mining (NMFS 2011). While individual components of this list of threats have fluctuated over the last 100 years, the general trend has been one of increasing and intractable pressure on aquatic resources. These influences have significantly altered steelhead habitat quantity and quality as described above. Fishing and hatchery stocking have also contributed to the decline, but their relative contribution has been minor (Jensen and Swartzell 1967, Shapovalov and Taft, Franklin 2005, NMFS 2011, Araki *et al.* 2007, 2008, 2009, Girman and Garza 2006, Garza and Clemento 2007, Clemento *et al.* 2009, CDFG 2010a, Christie *et al.* 2011, Abadia-Cardoso *et al.* 2011).

The acceptance of global climate change as a scientifically valid and anthropogenically driven phenomenon has been well established by the United Nations Framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change, and others (Davies *et al.* 2001, Oreskes 2004, UNFCCC 2006). The most relevant trend in climate change is the warming of the atmosphere from increased greenhouse gas emissions. This warming is inseparably linked to the oceans, the biosphere, and the world's water cycle. Changes in the distribution and abundance of a wide array of biota confirm a warming trend is in progress, and that it has great potential to affect species' survival (Davies *et al.* 2001).

Increased environmental variability resulting from projected climate change is now recognized as a new and more serious threat to the S-CCC steelhead DPS (NMFS 2011). Modeling of climate change impacts in California suggests that average summer air temperatures are expected to increase (Lindley *et al*. 2007). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe *et al*. 2004). Total precipitation in California may decline; critically dry years may increase (Lindley *et al*. 2007, Schneider 2007). The Sierra Nevada snow pack is likely to decrease by as much as 70 to 90% by the end of this century under the highest emission scenarios modeled (Luers *et al*. 2006). Wildfires are expected to increase in frequency and magnitude, by as much as 55% under the medium emissions scenarios modeled (Luers *et al*. 2006). Vegetative cover may also change, with decreases in evergreen conifer forest and increases in grasslands and mixed evergreen forests. The likely change in amount of rainfall in Northern and Central Coastal streams under various warming scenarios is less certain, although as noted above, total rainfall across the state is expected to decline. For the California North Coast, some models show large increases (75% to 200%) while other models show decreases of 15% to 30 % (Hayhoe *et al*. 2004). Many of these changes are likely to further degrade salmonid habitat by, for example, reducing stream flows during the summer and raising summer water temperatures. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia *et al.* 2002). In marine environments, ecosystems and habitats important to sub adult and adult salmonids are likely to experience changes in temperatures, circulation and chemistry, and food supplies (Feely *et al.* 2004, Brewer 2008, Osgood 2008, Turley 2008).

2. <u>Environmental Factors</u>

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. Variability in ocean productivity has also been shown to affect salmon production both positively and negatively (Beamish and Bouillion 1993, NMFS 2011). Additionally, reduction of marine-derived nutrients (MDN) to watersheds is a consequence of the past century of decline in salmon abundance, and may be contributing to the downward spiral of salmonid abundance (Bilby *et al*. 1996, Bilby *et al*. 1998, Gresh *et al*. 2000). Infectious diseases can also influence steelhead survival and can be exacerbated by factors such as warm water temperatures (Buchanon *et al*. 1983). Introductions of non-native aquatic species (including fishes and amphibians) combined with 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). In the most recent 2011 species status review, NMFS concluded that in combination with the other threats faced by the species, small populations of steelhead (like those found in the S-CCC steelhead DPS) may be more vulnerable to the effects of disease and/or predation. These effects may be heightened under conditions of periodic low flows or high temperatures which are characteristic of watersheds in this DPS (NMFS 2011).

## V. ENVIRONMENTAL BASELINE

The environmental baseline is the current status of species and critical habitat in the action area based on analysis of the effects of past and ongoing human and natural factors. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impacts of State or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The Carmel River is a central California coastal river that drains approximately 255 square miles of watershed to the Pacific Ocean. Land use within the Carmel River watershed is comprised of open space, grazing lands, viticulture, golf courses, and residential, suburban, urban, and light industrial developments (Carmel River Watershed Conservancy 2004). There are significant human impacts in the basin, including the over appropriation of surface and groundwater, urbanization, an expansive road network, operation of dams, and grazing and agriculture practices that cumulatively result in a degradation of habitat quality in the Carmel River (Smith *et al.* 2004).

### A. Status of Listed Species and Critical Habitat in the Carmel River

The Carmel River once contained the largest southernmost steelhead run in their present range. The Carmel River population of S-CCC steelhead is considered highly valuable as it likely provided frequent and occasional dispersal to the smaller coastal populations, which are not currently considered viable by NMFS and may not be able to persist without straying from the Carmel River population. Therefore, the Carmel River S-CCC steelhead run is one of the core

populations within the DPS that is targeted by NMFS for increased conservation and recovery efforts. If this run is improved, it will likely make a large contribution to the recovery of the DPS. Moreover, the Carmel River Watershed is considered unique from the other watersheds supporting the DPS in that the watershed provides habitat which results in a population that possesses both interior and coastal population attributes. As such, the Carmel River run of S-CCC steelhead is considered highly valuable compared to other populations within the DPS.

Unfortunately, based upon steelhead adult migration counts at the San Clemente and Los Padres Dams in the Carmel River; steelhead in this watershed have undergone a steady decline. The San Clemente Dam was built at RM 18.6 in 1921, and the Los Padres Dam was constructed 28 years later at RM 24.8 in 1949. According to the CDFG, the annual steelhead run prior to dam construction in the Carmel River was as much as 8,000 adults (Becker and Reining 2008). CDFG records of adult steelhead at the Los Padres Dam ladder fish trap from 1949 to 2008 ranged from 558 in 1962 to just 2 in 1973, with an average of 100 for the years in which counts were made. However, using observations from local field personnel, the CDFG estimated the annual steelhead spawning population in the mainstem Carmel River to be about 1,650 fish in 1965 (Titus *et al.* 2009). Upstream of Los Padres Dam, adult returns have averaged 190 fish since 1997. In the drought years of 1976 to 1977 no adult steelhead were captured in the Los Padres Dam ladder trap[6], and zero were observed at the San Clemente Dam fish ladder. In addition, during the 3-year period from 1988 to 1990, the river never breached the sandbar at the mouth, making the river inaccessible to adult steelhead thus no fish entered or left the river. Between Los Padres Dam and San Clemente Dam, a comparison of returns before and after 1980 indicates the adult return to this portion of the basin has not recovered to levels that were common to the Carmel River population prior to the 1976-1977 drought (MPWMD 2004).

The failure of steelhead numbers to return to levels seen before the 1976-1977 drought is likely due to the degradation of habitat in the Carmel River resulting from the dams and other factors. Nehlson *et al.* (1991) concluded the Carmel River steelhead stock was at a high risk of extinction. The population decline of steelhead in the Carmel River is the result of partial barriers to historic spawning and rearing areas due in part to dam presence at the Los Padres Dam (RM 24.8), San Clemente Dam (RM 18.6), and Old Carmel River Dam (RM 18.3), flow reductions from water diversion, and habitat fragmentation and degradation (MPWMD 2004; Titus *et al.* 2009). Additionally, pumping from wells for water supply downstream of Los Padres Dam removes a significant amount of water from the river when steelhead migrate. The reduced river flow presents additional impediments to migration due to seasonal river drying between Scarlett Narrows (RM 8.7) and the Pacific Ocean. Thus, steelhead in the Carmel River have their migration opportunities reduced because higher winter and early spring flows needed for migration are curtailed by the water storage and use described above.

Adult steelhead enter the Carmel River at its mouth in the Carmel Lagoon near the city of Carmel-by-the-Sea. Currently, using a combination of ladder counts, spawning redd surveys,

[6] Although it should be noted that the trap was not functional through much of its life and likely only captured a portion of the actual number fish attempting to pass the dam.

and angler surveys estimate that, in the absence of angling, about one half (55 percent) of the adults that enter the Carmel River move upstream of the San Clemente Dam (Dettman and Kelly 1986). The remaining adults spawn in tributaries or mainstem of the river downstream of the dam. In 2004, the MPWMD reported that the number of returning adults had rebounded from the drought years of the early 1990's and appeared to have stabilized in the range of 400 to 800 fish (MPWMD 2004). However, as described above, adult steelhead returns at the San Clemente Dam fish ladder have fluctuated considerably since 1965. Data From 1999-2011, ladder counts for steelhead adults returning to the San Clemente Dam numbered 472, 804, 642, 483, 388, 328, 368, 222, 412, 95, 157 and 234 (MPWMD 2003-2011). These years indicate a downward trend in numbers. Fisheries staff from the MPWMD consider the apparent decline in counts at the ladder to be due to mortality from various sources, and partly due to increased numbers of fish spawning before they reach the fish ladder in response to improved habitat conditions downstream of the dam. If spawning is occurring downstream of the dam, the decline in run size would be less steep than the decline in fish numbers at the ladder indicate (Williams *et al.* 2011).

A number of recovery related activities have been undertaken within the Carmel River which help ameliorate current impacts and may reduce threats in the future and lead to increased abundance of individual populations throughout the DPS. Upstream fish passage facilities have been constructed on the Carmel River at the Los Padres Dam with funding from the Carmel River Steelhead Association and CAW. Additionally, planning for the removal of San Clemente Dam in the Carmel River is near completion, and being funded by the CAW and the California Coastal Conservancy.

**B. Status of the Species and Critical Habitat in the Action Area**

The action area includes Los Padres Dam, extending downstream of the dam approximately 1,000 feet and upstream into the reservoir approximately 2070 feet. Los Padres Dam is a 148-foot-high earth-filled dam on the Carmel River with an embankment crest elevation of 1,058 feet. The spillway is an Ogee crest (weir) with a crest elevation of 1039.85 feet. When the reservoir elevation falls below the spillway crest (1,039.85 feet), no downstream migration pathway exists for steelhead. This current dam configuration restricts downstream migration for steelhead to only those times when water overtops the crest of the spillway. Once over the crest, fish are flushed down an approximately 600 feet long concrete spillway until water flow drops approximately 30 feet from the end of the spillway to the tailwater pool. Flow in the spillway runs very shallow downstream of the crest, and has been documented to cause physical injury and induce mortality. In 1984, CAW modified the spillway with the addition of a concrete curb in the lower 200 feet of the spillway, added a 16 foot steel extension to the end of the spillway, and removed bedrock from the right bank of the downstream plunge pool. These improvements were intended to concentrate downstream passage of fish to the right side of the spillway, improve hydraulic depth, and direct fish away from the bedrock at the end of the spillway and into the plunge pool. In recent years, a small notch has been cut in the spillway crest to provide outflow to a stage of 1039.12 feet. However, this 9-inch notch does not appear to improve

downstream passage conditions as fish are still observed to get trapped behind the dam crest, or once over, continue to be injured as they are flushed down the concrete spillway.

About 250 feet downstream of the dam on the left bank, a Denil ladder is in operation to transport upstream migrating steelhead to an adult fish trap. 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. Old upstream migration structures exist on the bank downstream of the currently operating trap. The old structures, both ladder/trap structures, were in use prior to the construction of the new trap located on the left bank. In recent years, large boulders have been placed in the Carmel River near the old structures to guide fish to the new ladder and trap. An auxiliary water line provides water from the west end of the spillway crest to the fish trap. Water, siphoned from the spillway forebay, is diverted to the fish trap and to a point about halfway up the Denil ladder to provide attraction flows for migrating adult steelhead. The auxiliary water line also leads to one of the old fish traps, but this extension is no longer in operation. The auxiliary water line runs along the left outside of the spillway for most of its length. Upstream adult steelhead migration occurs from December through April, with 95 percent of steelhead counted at San Clemente Dam from January through March (Wagner 1983). At the Los Padres Dam fish trap, adults have been reported between January through mid-May from 1995 to present, with peak activity February through April (MPWMD 2010). Arrival of the first adults observed between 1964 and 1975 was almost always preceded by flows of 200 cfs or greater, and the years where peak flows did not generally exceed 100 cfs had the lowest numbers of adult migrants reported (Snider 1983).

The period of active steelhead smolt downstream migration begins in December and continues through June, with the majority migrating in March, April, and May. In 1973, surveys reported a total estimated population of juvenile steelhead above Los Padres Dam of just over 20,000, and close to 18,000 in 1974 (Snider, 1983). Juvenile steelhead numbers between Los Padres Dam and San Clemente Dam were estimated at approximately 33,000 in 1973, and close to 20,000 in 1974 (Snider, 1983). In 1981, the CDFG estimated the juvenile steelhead population for the entire Carmel River watershed to be more than 114,000 individuals (Becker and Reining 2008). More recent surveys reported an average density estimate of 4,528 individuals per mile. A CDFG report in 1993 found a yearling-dominant population, and suggested there were inadequate hydraulic conditions to encourage out-migrating juvenile steelhead and kelts to pass over Los Padres Dam. This suggested these life stages remain trapped above the dam and appear to seek suitable spawning habitat in the upper river (Becker and Reining 2008). NMFS notes that these estimates are based mostly upon reaches upstream of the reservoir. The MPWMD conducts surveys of rearing juveniles during October of each year and has documented average juvenile densities of .58-1.42 fish/linear ft. with an average of 0.85 fish/linear ft. from 1990-2009. Surveys upstream of San Clemente Dam (above RM 18.6), and below the Los Padres Dam (RM 24.8) within the action area downstream of the reservoir have found an average juvenile density of .84 fish/linear ft. These numbers are similar to the 4,528 individuals per mile estimate (approximately .86 individuals per linear ft.). NMFS has used the .84/linear ft. average to estimate that approximately 1907 juvenile fish could be present in the action area (2070 ft.

upstream and 200 ft. downstream of the spillway) during construction activities. This average juvenile estimate was chosen because these numbers were taken from surveys within portions of the action area.

Steelhead spawning and rearing occur in the tributaries and mainstem of the Carmel River, although much of the historic spawning habitat between Los Padres Dam and San Clemente Dam is no longer used. Recent data comparing years 2007 and 2008 indicates 40% and 80% of steelhead spawn upstream of the San Clemente Dam (NMFS 2011), indicating a high percentage of spawning may be occurring above and below Los Padres reservoir. However, while there are reaches of steelhead spawning and rearing habitat upstream of Los Padres Reservoir, as previously described access to spawning and rearing areas above Los Padres Dam is restricted due to insufficient passage over the dam, although the Denil ladder and fish trap operations are improving this condition. A MPWMD report estimates Los Padres Dam limits access to about 50 percent of the spawning habitat for the Carmel River and 42 percent of rearing habitat (MPWMD 2004).

The MPWMD classifies parts of the action area as possessing perennial spawning and rearing habitat, although good quality spawning and rearing habitat is limited. However, fish are not expected to spawn in the portions of the action area where permanent structural elements will be constructed as this is not spawning habitat (*i.e.*, in the forebay immediately upstream of the dam crest, and at the bypass outfall immediately downstream of the spillway). The river's configuration within the action area is controlled by bedrock and large boulders. The reservoir itself is filling in with sediment and portions of the river immediately downstream of the dam (in the action area) have been degraded from channel incision, exposing the banks and riparian and wetland plant root structures to erosion and scour. The amount and quality of spawning habitat in these reaches is limited by the inadequate supply of gravel from the upper watershed, caused by entrapment of bedload in Los Padres Reservoir. No natural recruitment from upstream of Los Padres Reservoir has occurred since 1949, when Los Padres Dam was constructed. In addition, while the action area possesses adequate riparian vegetation for shading of the action area, temperatures often are above optimum for fish rearing due to sediment infilling of the reservoir, which induces higher water temperatures. Therefore, the water released during late summer and early fall is often too warm for good growth of steelhead and may affect the abundance and distribution of benthic macroinvertebrates downstream. Compounding the high temperature water is the tendency to release hydrogen sulfide (which is toxic to fish and other aquatic life) laden water, especially just prior to the fall turnover in the reservoir.

## C. Previous Consultations

Pursuant to section 7 of the ESA, NMFS has previously conducted one interagency consultation for a project that affected the action area of this project. In 2003, NMFS completed informal consultation with the Corps for the Los Padres Dam Fish Ladder Maintenance Project. The project entailed making modifications to dam spillway, and improvements or repair to the existing fish ladder and associated structures. NMFS concurred with the Corps' determination

that the project was not likely to adversely affect S-CCC steelhead, and improve fish passage conditions at Los Padres Dam.

## VI. EFFECTS OF THE ACTION

The purpose of this section is to identify the direct and indirect effects of the proposed action, and any interrelated or interdependent activities, on threatened S-CCC steelhead. Where data to quantitatively determine the effects of the proposed action on listed species and critical habitat is not available or limited, the assessment presented in this biological opinion relies on the best available and relevant qualitative data.

This approach was based on knowledge and review of the ecological literature and other relevant materials. This information was used to gauge the likely effects of the proposed project via an exposure and response framework that focuses on what stressors (physical, chemical, or biotic), directly or indirectly caused by the proposed action, that salmonids are likely to be exposed to. Next, we evaluate the likely response of salmonids to these stressors in terms of changes to salmonid survival, growth, reproduction, and changes to the ability of PCEs to support the value of critical habitat in the action area. PCEs include sites essential to support one or more life stages of the species. These sites for migration, spawning, and rearing in turn contain physical and biological features that are essential to the conservation of the species.

Effects to the species and critical habitat resulting from the construction of the downstream fish passage facility are expected to be minimal as the amount of in-water work is limited to setting piles for the floating surface collector, installation of the surface collector, setting anchors for the behavioral guidance system, and a small amount of streambank and channel manipulation for construction of the outfall and associated supports. The proposed in-water work will occur between July 1 and November 1 for one season to limit the exposure of S-CCC steelhead to the potential effects posed by construction activities. The remainder of the work is expected to occur on land and be fully isolated from the stream or reservoir; therefore, any effects from such work would be discountable. Operation of the facility in accordance with the intended fish passage goals of this project is expected to be wholly beneficial for steelhead.

1. <u>Injury or Death Due to Dewatering and Fish Capture and Relocation</u>

Three project elements that may require dewatering[7] for in-water work activities are the BGS anchors, the floating surface collector's piles, and the bypass conduit outfall supports. CAW will isolate the work areas with a circular cofferdam. The amount of area dewatered will depend to some extent on the water levels at the time of construction. When dewatering occurs, an approximate 225 $ft^2$ area within the reservoir would be dewatered for the BGS anchors, and an

[7] In drier years, dewatering may not be necessary, especially downstream of the dam. Additionally, it may not be possible to dewater the forebay during pile installation depending on the water levels at the time. However if drilled shaft construction is the chosen method for pile installation, dewatering will occur.

approximate 177 $ft^2$ area in the forebay of the reservoir might be dewatered for the piles required for the floating surface collector. Downstream of the reservoir, approximately 100 $ft^2$ would be dewatered for the bypass conduit and outfall foundations. Water inside the cofferdam would be pumped to an upland location and be allowed to infiltrate through the substrate.

Dewatering the work area may injure or kill steelhead by temporarily confining them to areas predisposed to dewatering or desiccation, increased water temperature, decreased dissolved oxygen concentration, and predation (Cushman 1985).

Any dewatering implemented during construction will only occur between July 1 and November 1 for one season. This timing avoids the migration and spawning season for steelhead. Therefore, adverse effects to steelhead adults, migration corridors, or spawning habitat are not expected to occur. However, rearing juveniles could be present. In order to minimize adverse impacts to juvenile steelhead, juvenile fish will be captured and relocated from inside the cofferdam area prior to work commencing. Juvenile S-CCC steelhead will be captured via electrofishing, seining and/or dip netting, and then placed in insulated, oxygenated tanks filled with Carmel River water, and transported to adjacent suitable habitat in the river.

Fish relocation activities pose a risk of injury or mortality to rearing juvenile steelhead. 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. However, as this project will only use methodologies in accordance with NMFS guidance (discussed above) and with experienced and expert crews; therefore, the potential for variable results is avoided. Since fish relocation activities will be conducted by qualified fisheries biologists following NMFS guidelines, direct effects to, and mortality of, juvenile steelhead during capture will be minimized. The CAW consultants' personnel are highly experienced at capturing and relocating juvenile steelhead therefore, based on similar relocation efforts NMFS is familiar with, approximately two percent of the fish may be injured or killed during relocation activities (Collins 2004, CDFG 2005, 2006, 2007, 2008, 2009, 2010b). Those fish that avoid capture may be exposed to risks described in the following section.

Dewatering at the project site is expected to cause temporary loss, alteration, and reduction of aquatic habitat. NMFS anticipates temporary and minimal changes in stream flow within and downstream of project sites during dewatering activities. These fluctuations in flow are anticipated to be small, gradual, and short-term due to the dewatering timeframe and methods proposed for this project. Stream flow diversions could harm individual rearing smolt and juvenile steelhead by concentrating or stranding them in residual wetted areas before they are relocated (Cushman 1985); these juvenile S-CCC steelhead that avoid capture in the project site will die dewatering activities through stranding. Based on similar dewatering projects (Alley 2004, Rich 2005, Michaud 2006, Cressey 2009), NMFS expects for the number of juvenile steelhead that will be killed (no more than one percent) as a result of stranding after dewatering activities to be less than those killed during capture and relocation (no more than two percent;

*See* Collins 2004, *supra*). Rearing steelhead could be killed or injured if stranded during and after dewatering activities, though direct mortality is expected to be minimal due to relocation efforts prior to dewatering.

Although sites selected for relocating fish should have ample habitat, in some instances relocated fish may endure short-term stress from crowding at the relocation sites. Relocated fish may also have to compete with other fish causing increased competition for available resources such as food and habitat (Keeley 2003). Some of the fish released at the relocation sites may choose not to remain in these areas and may move either upstream or downstream to areas that have greater habitat availability and a lower density of fish. 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 be large enough to affect the survival chances and fitness of individual fish. Once the project is complete, juvenile steelhead migration and rearing space will return to the dewatered area.

The amount of capture, injury or mortality of S-CCC steelhead due to dewatering, capture and relocation is dependent upon the number present in the area to be dewatered. The maximum area that would need to be dewatered for project construction would be 402 $ft^{2\ 2}$ for the BGS anchors, and 177 $ft^2$ for the floating fish collector) within the reservoir and 100 $ft^2$ within the stream channel downstream of the reservoir. As described below, fish may be relocated without dewatering if concrete slab construction is used; the area of such relocation is within the 250 ft. linear area noted below. Based on the numbers of juvenile steelhead in the action area, described in the Environmental Baseline, NMFS estimates summer fish numbers in the project area of approximately 0.84 fish/linear ft. in areas maintaining summer flow. Assuming a fish number of 0.84 fish/linear ft., a maximum of 250 linear ft.[8] of dewatering and/or relocation[9] area completed for one year, and injury or mortality of one percent due to crushing and stranding during dewatering and two percent from handling during capture and relocation, the Los Padres Dam Downstream Fish Passage Facility Project activities could result in capture and relocation of 210 juvenile steelhead and injury or mortality to approximately 3 juvenile steelhead due to stranding (1%) and 5 due to handling (2%) per year (.84 fish/ft. * 250 ft. = 210 fish; 210 fish * 0.03 = 7 total per one year[10]).

2. <u>Pile Installation for the BGS, Debris Boom and Floating Surface Collector</u>

As described previously, construction methods of installing the piles supporting the surface collector would be determined from geotechnical investigation prior to construction. However, there are three types of installation that may occur: 1) impact hammering, 2) drilled shaft technique, and 3) anchoring with grout to a concrete work pad. The potential effects to steelhead vary between these techniques.

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[8] This linear distance is estimated using information provided in the engineering design plans which indicate the areal extent in the action area that will require dewatering to accommodate construction of the project components.
[9] Fish capture and relocation may occur when dewatering is not done, as described for concrete slab construction.
[10] These numbers have been rounded to the greatest whole number.

*a. Impact hammering and Exposure to High Underwater Sound Pressure Levels*

It is anticipated the installation of the piles will occur in the summer during a period of low reservoir levels. Although drilling the piles in is the most likely scenario to occur, impact hammering may be required. Should impact hammering occur, NMFS estimates a maximum of two piles will be installed per day. There will be a maximum of four 18-inch diameter piles, and five 12-inch diameter piles installed for the project. The exact location (elevation of the reservoir and forebay) of the piles that support the surface collector has not been confirmed but based on original as-built drawings for the dam, the piles will be located near an elevation of 1,018 feet, however minor variation of this elevation will not affect the functionality of the structure. Placement of the anchors for the behavior guidance system will occur near an elevation of 1,035 feet. Hydrology data from 1998 through 2008 shows the average water surface elevations between July and November (the proposed in-water work time period) are 1006.6 -1042.9 feet. With the bottom contours of the reservoir at approximately 960 feet, the water depths in the reservoir could be between 46.6 and 82.95 feet deep. As stated previously, Based on past water levels in the action area during this time of year water depths during pile driving for the project are expected to be approximately 26.6-feet deep or less.

In 2008, the Fisheries Hydroacoustic Working Group (FHWG) established a dual metric criteria for sound pressure levels to establish a threshold for onset of physical injury to fish as a result of exposure to underwater sound pressure produced by pile driving. Specifically, this included a single strike peak SPL of 206 decibels (dB) referenced at one micropascal (re: 1 μPa) and an accumulated sound exposure level (SEL) of 187 dB referenced at on micropascal-squared-second (re: 1 $\mu Pa^2$-sec) for fish greater than or equal to 2 grams or 183 dB SEL (re: 1 $\mu Pa^{2-}$sec) for fish less than 2 grams. If either threshold is met or exceeded, then physical injury is assumed to occur. There is uncertainty as to the behavioral response of fish to high levels of underwater sound produced when driving piles in or near water. Until new information indicates otherwise, based on the most relevant data, NMFS believes a 150 dB root-mean-square pressure (RMS) threshold for behavioral responses for salmonids is appropriate (Feist *et al.* 1992, Turnpenny 1994, Fewtrell 2003, Nedwell *et al*. 2004).

If used, the effects of pile driving with an impact hammer range from sub-lethal, behavioral effects to physical injury and death. The severity of these effects depend on several variables, including the fish's proximity to the pile driving activity and sound pressure levels resulting from the pile driving activity. CAW will isolate the area for pile driving from the water column with a cofferdam, or use a bubble curtain to minimize noise from pile driving for impact hammering of piles. An effective bubble curtain is expected to reduce the sound pressure levels emanating from the piles by approximately 10 dB. NMFS has analyzed the effects of the proposed pile driving for the largest size (18-inch diameter[11]) pile expected to be installed for this project, including the proposed avoidance and minimization measures. Data taken from *A Compendium*

[11] Sound estimates for the 12-inch diameter piles are not provided in this analysis since their area of impact is expected to be included in the area of impact for the installation of the 18-inch piles,

*of Pile Driving Sound Data* was used to obtain reference SPLs produced during unattenuated impact hammer pile driving for 20-inch diameter steel pipe piles driven in water greater than 10 feet deep to most closely match the conditions expected for this project if no dewatering occurs[12]. Reference values were 208 dB peak 187 db $SEL_{single\text{-}strike}$ and 176 dB RMS measured at 10 meters. Using these data, and estimating a total of 200 strikes per day (100 strikes per pile, 2 piles maximum) with a transmission loss (TL) of 15 dB[13], and factoring in a 10 dB reduction for proper implementation of an effective bubble curtain or driven within a cofferdam, NMFS does not anticipate SPLs and SELs to exceed the current criteria for physical injury or death to fish of 206 dB peak SPL, 187 $SEL_{cumulative}$ beyond a 45 ft. radius, surrounding each pile for fish greater than or equal to 2 grams, or a 82 ft. radius for fish less than 2 grams. As distance from the pile increases, sound pressure levels decrease and the potential harmful effects to fish also decrease. Hence the distance to reach the 150 dB RMS corresponding to sub-injurious sound levels (*i.e.* non-lethal, behavioral responses), is not expected to extend beyond a 2070 ft. radius. Given that the distance to reach the RMS threshold exceeds the width of the reservoir, NMFS expects the entire reservoir to be temporarily subjected to sound pressure levels high enough to affect behavior of any juvenile fish located in the action area during pile driving. However, the 2070 ft. distance is a conservative estimate, since this distance to reach the 150 dB RMS threshold is based upon unimpeded linear sound transmission and does not take into account the higher degree of sound attenuation likely to occur from river bends and curves upstream of the reservoir. No sound pressure impacts are expected to occur downstream of the dam in the lower portion of the action area as sound pressure from pile driving in the reservoir or forebay is not likely to propagate to there. Based on the above pile driving sound analysis, NMFS expects for any fish present within the forebay, primarily juvenile S-CCC steelhead within a 82 ft. radius (within 45 ft. for fish greater than or equal to 2 grams, and 82 ft. for fish less than 2 grams corresponding top the 187 and 183 dB SEL distances), to be potentially be injured or killed during installation of the piles. Beyond this distance, extending to the 2070 ft. radius, juvenile fish may exhibit behavioral responses, but are not expected to be injured or expected to experience any reduction in fitness. Behavioral responses may include abnormal movements indicative of stress, such as startling, quick bursts of swimming speed, or temporarily moving from protective cover or foraging habitat. A fish that exhibits a startle response may not be injured, but it is exhibiting behavior that suggests it perceives a stimulus possibly indicating potential danger in its immediate environment, and startle responses are likely to extinguish after a few pile strikes, or diminish as if fish leave the area. Shin (1995) described the behavioral response of snakehead (*Channa argus*) to the noise of pile driving as "agitation" and these fish exhibited a change in swimming behavior. Fewtrell (2003) described the behavioral response of finfish to seismic survey noise as "alarm". However, this area corresponding to the 150 dB RMS isopleth is a very conservative distance, and probably an overestimate of the area impacted from high sound pressure waves as the bathymetry and configuration of the reservoir and upstream

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[12] Sound produced during pile driving in dewatered or dry conditions is not expected to propagate to areas where fish are likely to be present. Therefore, if pile driving is done under dry conditions, no adverse effects are expected to occur to fish.

[13] NMFS recommends using the Practical Spreading Loss model ($TL = 15*\log(R_1/R_0)$), unless data are available to support a different model. This model was applied to the hydroacoustic analysis for this project.

sections of the river will likely attenuate sound pressure levels at a closer distance in the action area.

Because of the nature of underwater sound propagation, wherein sound pressure radiates from the pile into the water column both laterally and longitudinally, using a fish per linear ft. estimate to quantify the number of fish affected from pile driving is not possible. Therefore, we use the area of impact surrounding each pile corresponding to the threshold levels for injury and sub-injury zones, and the time period for pile driving previously described, as the surrogate for number of fish. The 82 ft. radius underwater sound death/injury impact zone is entirely within the area expected to be dewatered (as discussed above) but does not fill the entire area proposed for dewatering. Therefore, NMFS expects for a smaller number of fish (less than 210) to be affected from impact hammering of piles. Beyond the zone of injury (past the 82 ft. radius) extending out to the 2070 distance upstream up fish could be disturbed and display behavioral changes as a result of brief, temporary high sounds pressures but are not expected to be injured.

Moreover, very few fish are expected to be affected during pile installation due to higher temperatures in the area typical during the summer months. Water temperatures commonly reach high temperatures, up to 22 degrees Celsius (°C) in the shallow water areas of the reservoir (between elevations 1,020 feet and 1,034) during the late summer and early fall months. Steelhead generally prefer water temperatures between 11 – 19°C and will actively avoid areas of high water temperatures (Myrick and Cech 1998). Upstream of the action area is the Ventana Wilderness area of the Carmel River. This area has much more desirable habitat conditions, conducive for steelhead rearing and spawning, due to better water quality parameters and instream habitat complexity as well as possessing a dense riparian canopy to shade aquatic habitat, reducing water temperatures. Therefore, NMFS expects most rearing steelhead will be found in stream habitats in the Ventana Wilderness, with very few steelhead near the forebay in the reservoir where piles will be installed (closest to the dam crest) during construction.

*b. Drilled Shaft Construction*

For drilled shaft construction, CAW will isolate the work area to the minimum extent needed with a circular cofferdam. Prior to dewatering the cofferdam, if any fish are present they will be captured and relocated from the area (See "1.Injury or Death Due to Dewatering and Fish Capture and Relocation" where these effects are taken into account). Water inside the cofferdam would be pumped to an upland location and be allowed to infiltrate through the substrate. Grout to hold the piling would be placed in the dry so water contamination is extremely unlikely. Except for the potential effects of relocation and dewatering noted previously, fish are not expected to be adversely affected during drilled shaft construction, as using this construction method avoids the creation of underwater sound pressures that might adversely affect fish, and the risk for water contamination, as described above, is discountable.

*c. Concrete Slab Construction*

The last alternative, using a concrete slab to support the piles, is advantageous because it allows the precise placement of the piles so the collector can slide smoothly, but this alternative also has the most risk of harming steelhead. The concrete slab would be poured in place through a metal tremie pipe, operated by underwater divers. Placement of green concrete in water in this fashion can cause localized increases in water pH that are harmful to fish (EPA 1986). To minimize potential effects on steelhead, CAW would isolate the forebay with a net and conduct fish capture in the isolated area (see "1.Injury or Death Due to Dewatering and Fish Capture and Relocation" where these effects are taken into account). Fish would be released to suitable habitat elsewhere. A fisheries biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish will conduct or supervise the fish capture and relocation operation. In addition, a turbidity curtain would be installed to contain water in the isolated area. Turbidity curtains will be made of a thick plastic and suspended by a series of foam booms sewn in the top edge of the plastic and a metal chain weighting down the bottom edge of the curtain. When in place, the curtain would form a barrier that (although not impermeable) would inhibit the mixing of water from the work area with the rest of reservoir. Fitch (2003) found that containing the work area with turbidity curtains can effectively limit the dispersion of high pH water. After exclusion and relocation, listed species are not expected to be in the area in which the turbidity curtain is placed.

After the concrete has been poured, the water within the work area will have greater pH than the reservoir. The turbidity curtain would remain in place for 24 hours following the completion of the piling foundation. During this time, high pH (greater than 9) water from the work area is expected to leak out from the turbidity curtain and dilute in the reservoir. Given the large volume of water within the reservoir the water from the work area is likely to quickly dissipate to safe levels within the pH ranges (6.5 to 9), which are levels generally considered safe for fish, so as to pose an insignificant risk to fish immediately outside of the curtain during the 24 hour period. The water pH levels will be tested prior to removing the turbidity curtains to ensure pH levels are safe for fish, and complied with state water quality standards. NMFS notes that this alternative is the least likely option to be implemented during construction, but has been included here for a thorough analysis of all potential construction scenarios for this project.

Additionally, as described above, water temperatures are expected to be high during concrete slab construction so steelhead will likely be located elsewhere, upstream of the reservoir in areas possessing better summer rearing conditions. If fish are present in the forebay during concrete slab construction, CAW would relocate them, and isolate the work area from the reservoir using the same methods described previously.

3. <u>Minor Stream Bank Alteration and In-water Excavation</u>

Minor stream bank alteration and in-water excavation is required for the construction of the outfall area, the behavioral guidance system anchors in the reservoir, and the outfall area downstream of the reservoir. The potential effects associated with in-water excavation include

increased turbidity and downstream sedimentation. If fish are present in the action area during construction, they will be relocated as discussed in the Section above regarding Dewatering and Fish Capture and Relocation. Because of this, and because work will occur only after work areas are isolated (dewatered) from Carmel River flows, and disturbed areas (including stream bed and bank areas) stabilized once work is completed, steelhead are not expected to be exposed to increased turbidity and sedimentation.

4. Effects of Operation and Maintenance

The proposed downstream fish passage facility was designed in cooperation with NMFS and is intended to be wholly beneficial for S-CCC steelhead DPS. When in operation, the fish passage facility will provide for volitional adult and juvenile steelhead passage around the dam at a greater range of flows than current conditions allow. The pipe size and outfall are designed to quickly and safely return steelhead to the Carmel River downstream of the dam. Because the facility is designed in accordance with our fish passage guidelines, NMFS expects the facility will allow a majority of downstream migrating adults and juveniles to safely move downstream past the dam, thus greatly improving survival of fish during their migration from spawning and rearing areas in the Carmel River downstream to the ocean. The transit time of fish through the system will vary somewhat, but is estimated at approximately one minute, and the height above the tailwater pool is set to minimize the potential for fish injury and to reduce fish impact velocities. The operation of the facility is designed to be a vast improvement over the current conditions, which expose fish to injury from passing over the ogee spillway (weir), where they continue down the spillway and outfall into the river. The effect of collecting downstream migrating adult and juvenile fish and providing safer passage downstream will benefit the steelhead population in the Carmel River. During periods of high flow, operation of the collector will be halted; during any temporary cessation of operation resulting from high flow, fish would descend the spillway as discussed in the environmental baseline section.

Maintenance of the facility will entail removing debris from the intake and performing a visual inspection of the facility's components. Maintenance activities for the facilities are not expected to require work that could result in deleterious effects to steelhead. If repairs or major maintenance is needed, CAW will contact NMFS and CDFG to ensure compliance with state and federal regulation, and proper repairs will be made.

5. Critical Habitat Effects

The PCEs of the designated critical habitat for steelhead affected by the proposed action are the freshwater migration corridor and rearing habitat for juvenile steelhead. The migration PCE requires freshwater migration corridors free of obstruction with water quantity and quality conditions that support juvenile and adult mobility and survival (50 C.F.R. § 226.211 (c) (3)). The rearing PCE requires freshwater sites with sufficient water quantity and floodplain connectivity to form and maintain physical habitat conditions and allow salmonid development and mobility; sufficient water quality to support growth and development; food and nutrient

resources such as terrestrial and aquatic invertebrates and forage fish; and natural cover such as shade, submerged and overhanging large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks (50 C.F.R. § 226.211 (c) (2)). Migration and rearing habitat in the action area will be temporarily disturbed by dewatering, sediment, turbidity, changes in flows, and potentially, poured concrete. Additionally, on an annual basis during migration periods, the BGS and floating fish collector will extend across the forebay to facilitate downstream fish migration (December – June), however, this is expected to benefit steelhead critical habitat by improving the migration pathway. Permanent changes include placement of piles and concrete blocks in the forebay of the reservoir to construct the debris boom and anchor the BGS and floating collector. The temporary impacts are expected to have insignificant or discountable impacts on the value of PCEs in the action are for S-CCC steelhead because: 1) with regard to the area's function as migration habitat, the temporary disturbance by sediment, turbidity, changes in flows, and potentially, poured concrete will be gone or dissipated to levels that do not affect steelhead prior to steelhead seasonal use of the area, or 2) with regard to the area's function as rearing habitat, the impact is so minor and limited in time (*e.g.*, pile installation) that PCEs will return to baseline conditions immediately once the impact ceases; the period of temporary disturbance is insignificant with regard to the species lifecycle habitat needs because juvenile steelhead will not be prevented from rearing in suitable habitat located elsewhere in the watershed. After construction is complete, the critical habitat PCE for migration in the action area is expected to be improved as a result of the project as this project will improve downstream fish passage at Los Padres Dam, which will benefit steelhead migration habitat. Permanent changes to the rearing PCE of critical habitat are so minor as to be insignificant. The placement of supports for the debris boom, BGS, floating fish collector and bypass outfall may result in some small loss of aquatic habitat space. However, due to the size of the area permanently impacted, that loss of space is not expected to alter the function of the action area for rearing. This habitat is currently not considered good rearing habitat due to high summer water temperatures and there is higher quality rearing habitat available to fish elsewhere in the watershed. The new fish passage structure will significantly improve migration habitat by providing access to better spawning and rearing habitat in the watershed, and decreasing potential injury associated with passage over the current dam spillway configuration.

## VII. CUMULATIVE EFFECTS

Cumulative effects are defined in 50 CFR § 402.02 as "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". Any future Federal actions will be reviewed through separate section 7 consultation processes and not considered here. NMFS does not anticipate any cumulative effects in the action area other than those ongoing actions already described in the Environmental Baseline above, and resulting from climate change. Given current baseline conditions and trends, NMFS does not expect to see significant improvement in habitat conditions in the near future due to existing land and water development in the watershed. In the long term, climate change may produce temperature and precipitation changes that may adversely affect steelhead habitat in the action area. Because this project will improve habitat, it

may help to provide some resilience to climate change by allowing more fish to migrate safely downstream, and potentially increasing additional spawning opportunities in subsequent years for kelts.

## VIII. INTEGRATION AND SYNTHESIS OF EFFECTS

S-CCC steelhead DPS are listed as threatened. Based on the extensive loss of historic habitat and degradation of remaining habitat due mainly to human activities (dams, water use, etc.) described in this opinion, the S-CCC steelhead DPS population in the Carmel River Watershed is likely to continue in decline absent efforts to improve and restore their habitat. Steelhead occur in the Carmel River in densities and abundance lower than historic conditions. Juvenile S-CCC steelhead DPS are expected to be present within the approximate 3000-foot long action area. However, due to the water levels and temperatures expected during timing of construction, the number of individuals present is expected to be very low, and those within the project vicinity during construction likely make up a very small percentage of steelhead in the Carmel River.

As described above, if dewatering can be used at the construction site, fish will be collected and relocated from the work area prior to dewatering (as noted above, fish may also be collected and relocated without dewatering). Experienced fish biologists are expected to work effectively and have low steelhead injury and mortality rates during fish collections. Fish located within the 45 and 82 ft. radial distances corresponding to the 187 and 183 dB SEL isopleths described previously upstream of the dam crest extending into the forebay and reservoir may be injured or killed as a result of impact hammering for pile installation. Fish located beyond the 82 ft. radial distance but within 2070 feet upstream of the reservoir may experience sub-injurious sound pressure level exposure (*i.e.*, behavior may be affected). However, pile driving is expected to be for a short duration, and there will be suitable minimization measures implemented (*e.g.*, bubble curtain) to decrease the potential for injury or mortality, thus fish are more likely to exhibit behavioral responses as a result of pile driving. Therefore, based on the analysis articulated above (including the low mortality rates for similar construction methods and relocation efforts), NMFS anticipates only a small number of juvenile steelhead will be harmed or killed by impact hammering of piles, fish capture and relocation, and dewatering during construction activities implemented for this project.

Anticipated mortality from dewatering, fish capture and relocation combined are expected to be less than 3 percent of the fish in the areas where dewatering, capture and relocation will occur. dewatered. Because no more than 210 juvenile steelhead are likely to be present in the areas dewatered, NMFS expects no more than 7 juvenile steelhead will be harmed or killed by dewatering, capture and relocation. If fish are not relocated prior to pile installation, NMFS expects a smaller number of fish will be present in the areas where pile driving is likely to cause injury or mortality. Based on these zones of impact within the water column surrounding the piles, NMFS expects that fish within an 82 ft. radius of the pile driving could be killed or injured; as stated above, this is expected to be fewer than 210 fish. Beyond the zone of injury (past the 82 ft. radius) extending out to the 2070 distance upstream up fish could be disturbed and display

behavioral changes as a result of brief, temporary high sounds pressures but are not expected to be injured. This small number represents a very low percentage of the Carmel River steelhead population.

Due to the relatively large number of juveniles produced by each spawning pair, steelhead spawning in the Carmel River watershed in future years are likely to produce enough juveniles to replace the few that may be lost at the project site due to construction activities. Thus it is unlikely that the small potential loss of juveniles by this project will impact future adult returns. Moreover, when construction for the project is completed, downstream fish passage over Los Padres Dam is expected to improve significantly, which is anticipated to improve juvenile and smolt survival rates and increase future spawning opportunities for kelts by allowing them to return once more to the ocean. Adverse effects to critical habitat from project construction are expected to be mostly temporary and associated with minor disturbances to the water column, streambed, and bank of the stream during construction activities. Permanent loss of habitat space is expected to be very small and have an insignificant impact on the value of critical habitat in the action area. As previously described, the proposed action is specifically intended to benefit the recovery of S-CCC steelhead DPS. Facilities were designed in cooperation with NMFS and CDFG to provide safe and efficient downstream fish passage for juveniles, smolts and kelts at Los Padres Dam. Therefore, once construction of the project is completed, it is expected to improve the PCE of migration critical habitat and be beneficial for steelhead.

## IX. CONCLUSION

After reviewing the best scientific and commercial data available, including current status of S-CCC steelhead DPS, the Environmental Baseline for the action area, the cumulative effects of the proposed Los Padres Dam Downstream Fish Passage Facility Project, it is NMFS' biological opinion that the Los Padres Dam Downstream Fish Passage Facility Project, as proposed, is not likely to jeopardize the continued existence of the S-CCC steelhead DPS.

After reviewing the best available scientific and commercial information, the current status of critical habitat, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is NMFS' biological opinion that the Los Padres Dam Downstream Fish Passage Facility Project is not likely to destroy or adversely modify designated critical habitat for S-CCC steelhead DPS.

## X. INCIDENTAL TAKE STATEMENT

Section 9 of the Endangered Species Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without 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 to include significant habitat modification or degradation which actually kills or injures fish or wildlife by

significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Section 7 (b)(4) of the ESA requires that when a proposed agency action is found to be consistent with section 7(a)(2) of the ESA, and the proposed action may incidentally take individuals of a listed species, NMFS will issue a statement that specifies the impact of any incidental taking of endangered or threatened species. It also states that reasonable and prudent measures, and terms and conditions to implement the measures, be provided that are necessary to minimize such impacts. Under the terms and conditions of section 7(o)(2) and 7(b)(4), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are nondiscretionary, and must be undertaken by the Corps or their designee so that they become binding conditions of the Corps permit issued to CAW, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions, or (2) fails to require a permittee or contractor to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms added to the grant, permit, or contract, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impact on the species to NMFS as specified in the incidental take statement (50 CFR §402.14(I)(3)).

This incidental take statement is applicable to all activities related to the Los Padres Dam Downstream Fish Passage Facility Project described in this opinion. Unless modified, this incidental take statement does not cover activities that are not described and assessed within this opinion.

## A. Amount or Extent of Take

The amount or extent of take described below is based on the analysis of effects of the action done in the preceding biological opinion. If the action is implemented in a manner inconsistent with the project description provided to NMFS, and as a result take of listed species occurs, such take would not be exempt from section 9 of the ESA.

NMFS anticipates that incidental take S-CCC steelhead DPS may occur as a result of dewatering, fish capture and relocation, and pile driving in the action area. However, NMFS anticipates that the number of individual fish affected by incidental take of the S-CCC steelhead DPS will be low, and limited to the juvenile life history stage. Incidental take is anticipated to occur as a result of dewatering and fish capture and relocation activities. Incidental take will be

exceeded if more than 210 juvenile steelhead are captured for relocation, or more than 7 are killed or injured during capture and relocation activities.

Take is also likely to occur as a result of sound pressure waves from pile driving with an impact hammer. Because finding fish that have been injured or killed due to sound pressure waves will be unlikely because of the fish's small size, lack of water clarity, and scavengers (which are likely to quickly eat dead fish), NMFS will use the expected extent of sound pressure waves in the action area as a surrogate for the amount of incidental take. Injury or mortality of fish as a result of pile driving is expected to be limited to those fish 2 grams or larger located within the 45 ft. radius, surrounding each pile, and the 82 ft. radius for fish less than 2 grams corresponding top the 187 and 183 dB SEL distances. If project hydroacoustic monitoring indicates that sound pressure levels greater than 187 dB SEL (re: 1 $\mu Pa^2$-s) extend beyond 45 feet during the installation of any of the piles, the amount of incidental take may be exceeded. If project hydroacoustic monitoring indicates that sound pressure levels greater than 183 dB SEL (re: 1 $\mu Pa^2$-s) extend beyond 82 feet during the installation of any of the piles, the amount of incidental take may be exceeded.

**B. Effect of the Take**

In the accompanying biological opinion, NMFS has determined that the anticipated take is not likely to result in jeopardy to the species.

**C. Reasonable and Prudent Measures**

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

1. Undertake measures to ensure that harm and mortality to steelhead resulting from fish relocation and dewatering activities is low.

2. Utilize measures to minimize and avoid the take of S-CCC steelhead from pile driving.

3. Ensure construction BMPs are implemented in a manner that avoids injury or harm to steelhead from degradation of aquatic habitat and stream water quality.

4. Prepare and submit a report to document the effects of construction and relocation activities and performance.

**D. Terms and Conditions**

In order to be exempt from the prohibitions of section 9 of the ESA, the Corps, its permittees, and their designees must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and define the reporting and monitoring requirements. These terms and conditions are nondiscretionary.

1. The following terms and conditions implement reasonable and prudent measure 1:

   a. The Corps and/or the permittees must retain qualified biologists with expertise in the areas of anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid/habitat relationships; and biological monitoring of salmonids. The Corps and permittees must ensure that all biologists working on these projects are qualified to conduct fish collections in a manner which minimizes all potential risks to steelhead. Electrofishing, if used, must be performed by a qualified biologist and conducted according to *NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act*, June 2000. See: http://www.nwr.noaa.gov/ESA-Salmon-Regulations-Permits/4d-Rules/upload/electro2000.pdf.

   b. The biologists must monitor the construction site during placement and removal of cofferdams, construction of concrete pads, and access ramps to ensure that any adverse effects to salmonids are minimized. The biologists must be on site during all dewatering events to capture, handle, and safely relocate steelhead.

   c. Steelhead must be handled with extreme care and kept in water to the maximum extent possible during rescue activities. All captured fish must be kept in cool, shaded, aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream, and fish must not be removed from this water except when released. To avoid predation, the biologists must have at least two containers and segregate young-of-year fish from larger age-classes and other potential aquatic predators. Captured steelhead will be relocated, as soon as possible, to a suitable instream location in which suitable habitat conditions are present to allow for adequate survival of transported fish and fish already present.

   d. If any steelhead are found dead or injured, the biologist must contact NMFS biologist Jacqueline Meyer by phone immediately at (707) 575-6057 or the NMFS North Central Coast Office at 707-575-6050. The purpose of the contact is to review the activities resulting in take and to determine if additional protective measures are required. All steelhead mortalities must be retained, placed in an appropriately-sized sealable plastic bag, labeled with the date and location of collection, fork length, and be frozen as soon as possible. Frozen samples must be retained by the biologist until specific instructions are provided by NMFS. The biologist may not transfer biological samples to anyone other than the NMFS Santa Rosa Area Office without obtaining prior written approval from the NMFS Santa Rosa Area Office, Supervisor of the Protected Resources Division. Any such transfer will be subject to such conditions as NMFS deems appropriate.

2. The following term and condition implements reasonable and prudent measure 2:

a. To assess the level of impact to fish, hydroacoustic monitoring must be implemented within the vicinity of pile driving operations to ensure effectiveness of the bubble curtain and that estimated distances to reach sound thresholds are not exceeded. Monitoring must be performed during impact pile driving events for all of the piles driven with an impact hammer. A draft monitoring plan must be submitted to NMFS for review and approval 60 days prior to the start of in-water impact pile driving. Preliminary findings from daily hydroacoustic monitoring must be provided to NMFS' NCCO in Santa Rosa within 24 hours of monitoring.

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

a. The Corps and permittees must allow any NMFS employee(s) or any other person(s) designated by NMFS, to accompany field personnel to visit the project sites during activities described in this opinion.

b. Contractors must have a supply of erosion control materials, and fuel and hydraulic fluid spill containment supplies onsite to facilitate a quick response to unanticipated storm events, or fuel or hydraulic fluid spill emergencies.

c. Construction equipment used within the creek channel must be checked each day prior to work within the creek channel (top of bank to top of bank) and, if necessary, action will be taken to prevent fluid leaks. If leaks occur during work in the channel (top of bank to top of bank), the Corps, the permit holders, or their contractor must contain the spill and remove the affected soils.

d. All pumps used to divert live stream flow, outside the dewatered work area, must be screened and maintained throughout the construction period to comply with NMFS' Fish Screening Criteria for Anadromous Salmonids. See: http://swr.nmfs.noaa.gov/hcd/fishscrn.pdf.

e. Once construction is completed, all temporary, construction related, project-introduced material (cofferdams, *etc*.) must be removed by November 1.

4. The following term and condition implements reasonable and prudent measure 4:

a. The Corps and permittee must provide a written report to NMFS by January 15 of the year following construction of the project. The report must be provided to NMFS' North Central Coast Office, Attention: Jacqueline Meyer, 777 Sonoma Avenue, Room 325, Santa Rosa, California, 95404-6528. The report must contain, at a minimum, the following information:

i. **Construction related activities --** The report must include the dates construction began and was completed; a discussion of any unanticipated effects or unanticipated levels of effects on steelhead, a description of any and all measures taken to minimize those unanticipated effects and a statement as to whether or not the unanticipated effects had any effect on ESA-listed fish; the number of steelhead killed or injured during the project action; and photographs taken before, during, and after the activity from photo reference points.

ii. **Fish Relocation --** The report must include a description of the location from which fish were removed and the release site including photographs; the date and time of the relocation effort; a description of the equipment and methods used to collect, hold, and transport salmonids; if an electrofisher was used for fish collection, a copy of the logbook must be included; the number of fish relocated by species; the number of fish injured or killed by species and a brief narrative of the circumstances surrounding ESA-listed fish injuries or mortalities; and a description of any problems which may have arisen during the relocation activities and a statement as to whether or not the activities had any unforeseen effects.

## XI. REINITIATION NOTICE

This concludes formal consultation for the Los Padres Dam Downstream Fish Passage Facility Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of incidental take is exceeded, formal consultation must be reinitiated immediately.

## XII. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, or to develop information.

NMFS recommends that the Corps should ensure that CAW enters into a Memorandum of

Agreement (MOA) outlining their commitment to operation and maintenance of the facility, including the implementation of agreed upon corrective measures to ensure that the fish passage goals of the project are being met. This MOA should be provided to NMFS no later than one year post-construction of the project.

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