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

December 18, 2019

Refer to NMFS No: WCRO-2019-03028
WCRO-2019-03027

James Mazza
Acting Chief, Regulatory Division
U.S. Army Corps of Engineers, San Francisco District
450 Golden Gate Avenue, 4th Floor, Suite 0134
San Francisco, California 94102-3406

Re: Endangered Species Act Section 7(a)(2) Biological Opinion, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Reinitiation of the Newell Creek Access Road Bridge Rehabilitation Project (Corps File No. 2019-00106S) and the Newell Creek Dam Inlet/Outlet Replacement Project (Corps File No. 2010-0087S) located in Ben Lomond, Santa Cruz County, California

Dear Mr. Mazza:

Thank you for your letters of September 23, 2019, requesting reinitiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Newell Creek Access Road Bridge Rehabilitation Project (Corps File No. 2019-00106S) and the Newell Creek Dam Inlet/Outlet Replacement Project (Corps File No. 2010-0087S) pursuant to Section 404 of the Clean Water Act of 1972, as amended (33 U.S.C. § 1344 *et seq.*). The Corps of Engineers (Corps) has requested reinitiation of consultation with NMFS to address take exceedance during construction of the Newell Creek Access Road Bridge Rehabilitation Project and to adjust expected steelhead abundance (and potential take) at the Newell Creek Dam Inlet/Outlet Replacement Project site located just upstream of Newell Creek Access Road Bridge. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402, 84 FR 45016).

Thank you, also, for your request for reinitiation of consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA)(16 U.S.C. 1855(b)) for this action.

On August 14, 2019, NMFS issued its biological opinion (WCRO-2019-00416 and WCRO-2019-00417) to the Corps for their authorization of the City of Santa Cruz's construction of the Newell Creek Access Road Rehabilitation Project and their Newell Creek Dam Inlet/Outlet Replacement projects, located in Ben Lomond, California. Between late August and September 2019, the City of Santa Cruz and its contractors constructed the Newell Creek Access Road Bridge Rehabilitation Project. Fish capture and relocation activities were conducted prior to and during the dewatering of 170 feet of Newell Creek within the action area. A total of 51 juvenile steelhead (*Oncorhynchus mykiss*) were found, of which 3 fish were killed, and the rest were safely relocated to habitats downstream of the action area. In our August 14, 2019 biological opinion, we used the limited existing fish abundance data from this area of Newell Creek (2 fish

per 100 feet, summer 2007), to estimate no more than 20 juvenile steelhead would be present within action area, and no more than 2 would die as a result of capture or dewatering activities. As such, take was exceeded. We also used the same limited dataset to estimate the potential abundance of juvenile steelhead within the action area of the pending Newell Creek Dam Inlet/Outlet Replacement Project at no more than 100 fish with no more than 5 mortalities. The enclosed biological opinion replaces the original biological opinion, and includes our evaluation of the observed take during the Newell Creek Access Road Bridge Replacement Project, and evaluates the higher estimated take outlined in the revised incidental take statement for the pending Newell Creek Dam Inlet/Outlet Replacement Project.

The enclosed biological opinion is based on our review of the proposed projects and describes NMFS' analysis of the effects on threatened Central California Coast (CCC) steelhead, and on designated critical habitats for CCC steelhead and CCC coho salmon (*O. kisutch*) in accordance with section 7 of the ESA.

In the enclosed biological opinion, NMFS concludes that implementation of the Newell Creek Dam Inlet/Outlet Replacement Project and the exceedance of take resulting from the completed Newell Creek Access Road Bridge Rehabilitation Project are unlikely to jeopardize the continued existence of threatened CCC steelhead, nor are the projects likely to result in the destruction or adverse modification of critical habitat for CCC steelhead or CCC coho salmon. However, NMFS anticipates take of CCC steelhead will occur during implementation of the Newell Creek Dam Inlet/Outlet Replacement project. An incidental take statement with non-discretionary terms and conditions is included with the enclosed biological opinion. NMFS has also found that the proposed actions are not likely to adversely affect the endangered CCC coho salmon Evolutionary Significant Unit.

Please contact Joel Casagrande of the NMFS North-Central Coast Office in Santa Rosa, California at (707) 575-6016, or joel.casagrande@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: Daniel Breen, Corps, San Francisco, Daniel.B.Breen@usace.army.mil
E-File: ARN File # 151422WCR2019SR00094
E-File: ARN File # 151422WCR2019SR00095

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

Reinitiation of the Newell Creek Access Road Bridge Rehabilitation Project (Corps File No. 2019-00106S) and the Newell Creek Dam Inlet/Outlet Replacement Project (Corps File No. 2010-0087S) located in Ben Lomond, Santa Cruz County, California

NMFS Consultation Number: WCRO-2019-03027 and WCRO-2019-03028
Action Agency: U.S. Department of the Army, Corps of Engineers, San Francisco District

Table 1. Affected Species and NMFS' Determinations:

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

Table 2. Essential Fish Habitat and NMFS' Determinations:

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	No

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

Issued By:

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Date: December 18, 2019

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1. INTRODUCTION

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

1.1 Background

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

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

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within two weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at NMFS North-Central Coast Office in Santa Rosa, California (ARN #s 151422WCR2019SR00094 and 151422WCR2019SR00095).

1.2 Consultation History

1.2.1 Newell Creek Access Road Bridge Scour Rehabilitation Project

On May 8, 2019, NMFS requested additional information on the proposed scour rehabilitation design including whether or not the design could be modified to reduce the amount of rock fill and to include the use of large wood (logs and rootwads) to reduce flow velocities, minimize future potential impacts to the bridge's other support pier, and to increase habitat complexity in the creek at the site. NMFS also requested information on the amount of vegetation anticipated to be cleared for access to the creek channel and installation of the rock.

On June 7, 2019, the City of Santa Cruz provided updated information regarding vegetation removal and the number and size of trees planned for removal, the amount (acres) of wetlands and waters that would be temporarily and permanently impacted by the project, and they indicated revisions of the bridge scour protection designs were being developed that would incorporate wood features to the bank and channel. The revised designs were estimated to be available by June 24, 2019. Based on this response, NMFS determined the information received was sufficient to initiate consultation.

On June 26, 2019, NMFS received an update on the project including general information on the types of wood structures that were being included in the bridge scour designs and an update on the amount of rock fill proposed for the project. In response to NMFS' initial questions, the City of Santa Cruz reassessed the channel hydraulics (using HEC-RAS modeling platform) and assessed different fill volume alternatives. The results of this modeling indicated they could

substantially reduce the amount of proposed fill from approximately 250 cubic yards (cy) as originally proposed, down to approximately 90 cy. In addition, instead of using a geotextile fabric layer beneath the rock fill, the City of Santa Cruz would instead use gravel to serve as a base filter layer, and portions of the rock fill would be backfilled with soil and planted with native vegetation.

On August 14, 2019, NMFS completed formal consultation and issued its biological opinion to the Corps for their authorization of the Newell Creek Access Road Bridge Rehabilitation Project and the Newell Creek Dam Inlet/Outlet Replacement Project. In the opinion, NMFS concluded the proposed actions were not likely to jeopardize the continued existence of threatened Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) Distinct Population Segment (DPS), nor adversely modify designated critical habitat for the CCC steelhead DPS and the CCC coho salmon (*O. kisutch*) Evolutionary Significant Unit (ESU). NMFS, however, anticipated potential injury or mortality of CCC steelhead as a result of fish capture and relocation and channel dewatering activities. Therefore, an incidental take statement with non-discretionary terms and conditions was included with the biological opinion. Past data on steelhead abundance in this portion of Newell Creek were scarce with only one known sample event during the summer of 2007. Using this data (steelhead density of 2 fish per 100 feet, Hagar 2007) and accounting for annual variability, NMFS estimated no more than 20 juvenile steelhead would be found in approximately 190 feet of stream, and no more than 2 would die from these activities.

The Corps issued its permit (Corps File No. 2019-00106S) to the City of Santa Cruz for the Newell Creek Access Road Bridge Rehabilitation Project on August 15, 2019. On September 5 and 6, 2019, fish relocation and dewater activities were conducted in 170 feet of Newell Creek, which resulted in the collection of 51 juvenile steelhead, of which 3 died (2 during backpack electrofishing and 1 during dewatering). Although incidental take was exceeded, the site was successfully dewatered and there were no additional threats to steelhead from construction. Therefore, the City of Santa Cruz continued with project construction and completed the Newell Creek Access Road Rehabilitation Project as proposed on October 14, 2019. The Newell Creek Dam Inlet/Outlet Replacement Project is still scheduled to begin in 2021 or 2022. The Corps requested reinitiation of formal consultation for the Newell Creek Access Road Bridge Rehabilitation Project on September 19, 2019, and NMFS reinitiated formal consultation on September 23, 2019.

1.2.2 Newell Creek Dam Inlet/Outlet Replacement Project

On May 20, 2019, NMFS requested information on the number of seasons the channel would be dewatered for the project and the total length of the channel proposed for dewatering. On May 30, the Corps confirmed dewatering would only occur during the first of two construction years. On June 4, 2019, NMFS requested information on the number and sizes of trees planned for removal related to the dam inlet/outlet replacement project. NMFS and the City of Santa Cruz exchanged emails on June 14 and June 18 regarding more specific information on the trees planned for removal, particularly the number and species of trees greater than 24 inches diameter at breast height (DBH).

Based on correspondence with the City of Santa Cruz and agreements to provide the requested information in the near future, NMFS determined there was sufficient information to initiate consultation on June 7, 2019.

On June 17, 2019, the City of Santa Cruz provided the total lengths by habitat type (i.e. spillway plunge pool and Newell Creek) that would be dewatered.

On June 24, the Corps provided NMFS with a proposed mitigation summary prepared by the City of Santa Cruz (City of Santa Cruz 2019), which described riparian vegetation restoration plans as well as plans for the rehabilitation or replacement of four existing, but failed, log weirs in Newell Creek located just downstream of the inlet/outlet project construction footprint. The enhancement of these log weirs with new and/or improved wood features would serve as mitigation for the permanent loss of wetlands and waters associated with project construction and are expected to enhance habitat complexity and flow velocity diversity within the creek.

As described above, anticipated take of CCC steelhead for the Newell Creek Access Road Bridge Rehabilitation Project was exceeded during fish relocation and dewatering activities. Because both the Access Road Bridge Rehabilitation and Dam Inlet/Outlet Replacement projects are in close proximity to each other on Newell Creek and the same limited data were used to project steelhead abundance and incidental take for both projects, NMFS informed the Corps it will use the current fish abundance estimates to revise its incidental take statement for the pending Inlet/Outlet Replacement Project. The Corps requested reinitiation of formal consultation for the Newell Creek Dam Inlet/Outlet Replacement Project on September 19, 2019, and NMFS reinitiated formal consultation on September 23, 2019.

1.3 Proposed Federal Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02).

Construction of the Newell Creek Access Road Bridge Rehabilitation Project was completed as proposed on October 14, 2019. Incidental take was exceeded during construction, which is described above (1.2 Consultation History) and below (2.4 Environmental Baseline). The revised proposed federal action is now limited to the Newell Creek Dam Inlet/Outlet Replacement Project.

The City of Santa Cruz is proposing to replace the inlet/outlet works at Newell Creek Dam (NCD), which is approaching the end of it useful design life as illustrated by three primary identified deficiencies: inlet/outlet conduit deterioration, an inoperable fifth intake, and an inoperable plug valve at the outlet structure (Figure 1). The NCD inlet/outlet pipeline portion of the inlet/outlet works is original and corroding as is typical of steel infrastructure of this age. The lowest of the five original inlets of the sloping inlet portion of the works within the reservoir was buried by sediment and surficial landslide material and subsequently capped with a blind flange in 2012. A 24-inch plug valve at the downstream toe of the dam that would normally control operational and emergency releases from the reservoir to Newell Creek is currently stuck in a partially open position and is inoperable (Dudek 2018). Additionally, the steel liners for sloping inlet and concrete conduit are deteriorating due to lack of protective lining.

The proposed project is necessary to protect the City of Santa Cruz's ability to deliver drinking water to its customers. Currently, the reservoir is the only asset which provides drinking water security in the City's water system in the form of water storage. Future failure of the existing inlet/outlet works would eliminate the City's ability to provide drinking water to its customers during two curtail periods: during dry summer months when other sources cannot meet demand, and during winter when other water sources are too turbid due to storm run-off. The proposed improvements will furthermore improve the City's overall operational efficiency, improve system performance, and provide for long-term reliable storage for the City's drinking water supply. The project is also necessary for the City of Santa Cruz to meet Department of Water Resources' Division of Safety of Dams requirements for reservoir draw-down in an emergency.

Major construction elements include: grading to create an approximate 0.5-acre construction platform at the toe of the dam; excavation of a tunnel under the dam to house the inlet/outlet conduit; and subsurface dredging and installation of the new intakes in the reservoir. A temporary boat launch facility, or pier, would be installed in the reservoir near the intake construction area for equipment and materials during construction within the reservoir. Grading and excavation of the construction platform and tunnel would result in approximately 22,000 cy of spoils that would be permanently placed onsite (at identified staging areas) or hauled offsite to a suitable user or disposal site.

Project construction activities would include importing materials (i.e., concrete, steel reinforcement, steel pipe, valves, and asphalt), grading to develop the "construction platform" at the toe of the dam, improving dam access routes, dredging of reservoir sediments to bedrock and drilling from a barge, in-water work, tunneling with mechanical excavators, hauling of spoils from the site, fabricating and assembling infrastructure, and decommissioning existing infrastructure. Project construction would require use of heavy equipment such as cranes, excavators, bulldozers, dump trucks, loaders, backhoes, and generators. Road-headers with pre-excavation probing and grouting would likely be used for construction of the tunnel. Haul trucks would be used to transport materials to the site and to transport spoils offsite to a permanent disposal location. On average during project construction, approximately 10 construction workers are estimated to be working at the project site each day with a maximum of 20 during peak construction periods.

1.3.1 Description of Project Components and Construction Approach

Dewatering and Fish Relocation

Construction of the Newell Creek Pipeline (NCP) across Newell Creek and the proposed new culvert crossing at the spillway plunge pool will require channel dewatering. Releases from Loch Lomond Reservoir will be re-routed around the construction area, and both the spillway plunge pool and an approximate 200-foot long section of Newell Creek would be dewatered. This will include the construction of a temporary cofferdam at the downstream end. Prior to dewatering, the reach proposed for dewatering will be isolated by block nets. Once isolated, multiple passes using seine and/or backpack electrofishing will be made throughout the isolated area to capture and relocate fish to suitable habitat downstream. Once all fish able to be relocated using seines and electrofishing have been captured, transported, and released, the on-site fisheries biologist will clear the site for bypass flow re-routing and dewatering. Following re-routing of the

releases, the fish removal effort will resume, systematically electrofishing and/or seining the spillway plunge pool and Newell Creek until zero catch is obtained. This would occur in concert with dewatering by the construction contractor. The fisheries biologist onsite will help the contractor determine where pumps will be placed for dewatering to limit the potential for fish entrainment, and monitoring of the dewatering process will be ongoing to prevent any entrainment. The pumps will be isolated via block nets and screened to prevent fish entrainment. Sampling of the spillway plunge pool and seepage channel will continue until no fish are captured and the pool and channel are completely dewatered.

Creation of a Tunnel Portal-Construction Site, or Construction Platform
The staging area at the tunnel portal would require grading to create a construction platform and to provide adequate turning radii for haul trucks (i.e., cut, fill, and grading). An approximate 0.5 acre area would be graded. The staging area would accommodate tunneling equipment such as spoil removal system, guidance and control system, and cranes. The tunnel portal would be located on the ridge adjacent to the existing outlet structure. The ridge would be excavated down to approximately elevation 392 feet and the area downstream of the outlet structure would be filled in to a matching grade to create a construction platform.

New Intake Structure
The existing NCD sloping inlet/outlet structure consists of five 12-inch diameter inlet/outlet gates connected to a 24-inch diameter cement mortar-lined steel pipe encased in reinforced concrete on the upstream face of the dam. The new intake structure consists of three inlets/outlets (lower, middle, and upper) that each tie into the inlet/outlet conduit in the proposed tunnel via vertical shafts drilled through the reservoir bed. The intake structure would be installed in the water while reservoir elevations are within the normal operating range (typically between elevations. 562.2 and 577.2 feet). The structure would be placed on the right abutment of the dam and would include an air vent that extends up the dam embankment to the dam crest. The new structure would cover a submerged reservoir area of approximately 0.3 acres. The three independent inlets would allow the system to remain operational if the Reservoir needs to be lowered after a major seismic event.

Each of the three inlets would include a drum-style inlet screen. Based on preliminary discussions with manufacturers, the screens would be 48 inches in diameter, 54 inches tall, and have a 30 inch outlet flange connection. Screen wires would be constructed with copper-nickel alloy with a slot width of 0.5 inches. For normal releases, each screen would be sized to pass a volumetric flow of approximately 20 cfs with a through velocity of 0.5 foot/second. Under an emergency drawdown scenario, a flow of approximately 164 cfs would be distributed through a minimum of two of the three inlet screens.

New Inlet/Outlet Conduit Tunnel
A tunnel with a maximum diameter of 14 feet would be constructed through the dam's right/west abutment using conventional tunneling methods. The tunnel would be approximately 1,500 feet long, with two short straight segments near the tunnel portal located on the downstream side of the dam and the terminus within the reservoir, and a 600-foot radius curve connecting the two. The tunnel would extend from the tunnel portal in a curved alignment in the dam's west

abutment, with sufficient bedrock cover of approximately 40 to 50 feet at depths of approximately 50 to 200 feet below ground surface.

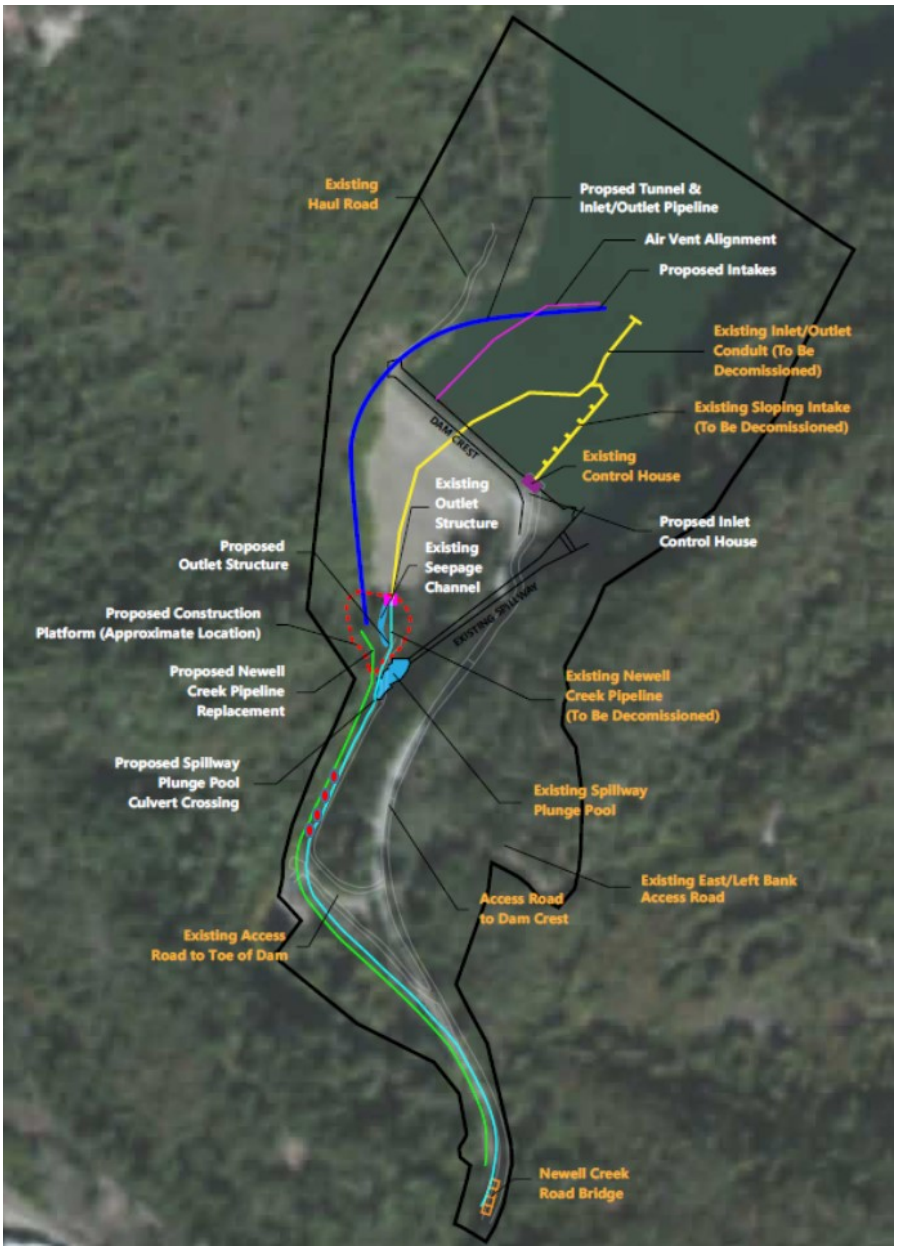

Figure 1. Map of existing and proposed project facilities/components for the Newell Creek Dam Inlet/Outlet Replacement Project. The red dots downstream of the plunge pool are the approximate locations of the existing failed log weirs proposed for replacement as part of Mitigation Project 3.

A 48-inch inlet/outlet pipe and a secondary 10-inch carrier pipe for instream beneficial releases would be routed in the tunnel. The tunnel portal would be located on the ridge adjacent to the existing outlet structure. The ridge would be excavated, and the area downstream of the outlet

structure would be filled in to a matching grade to create a “construction platform”, which is described below.

Dredging in the area of the inlet structure down to bedrock (in the reservoir) would be required to provide an adequate foundation for the new inlets and air vent. The proposed dredging would be within an approximately 1.5-acre area. Bedrock is anticipated to be approximately 13 feet to 30 feet deep. It is currently anticipated that the bedrock would be laid back to a 1.5-to-1 (horizontal to vertical) height. Unconsolidated material outside of the bedrock area would be laid back at a 2:1 (horizontal to vertical) height for stability. The estimated quantity of dredged materials in the reservoir is expected to be 23,000 to 28,000 cy. The dredged material would be disposed of by placement in the thalweg of the reservoir.

All dredging and spoils placement in the reservoir would be performed within the confines of silt curtains to contain the area of high turbidity and to maintain water quality elsewhere in the reservoir. Silt curtains can be made from semi-porous material or from material with nearly no porosity. Dredged materials could be placed up to elevation 460 feet, or approximately the top elevation of the lowest vertical shaft. The area required for the dredged material would be approximately 1.3 acres. Although the placement of dredged material would constitute a discharge of fill, there would be no loss of waters of the United States (U.S.), and there would be no adverse impact to any existing aquatic resource functions or services.

Upon completion of dredging, vertical shafts would be drilled into the reservoir bed at each of the three inlets from a barge in the reservoir. The vertical shafts would be a minimum of 60-inch-diameter shafts with a casing pipe. Vertical steel standpipes would be placed inside the casing and grouted. An inlet valve and cap would then be placed on top of each standpipe for a double seal. Upon completion of the shafts, any necessary detail excavation to accommodate the surrounding concrete mat would be completed, and a concrete mat to support the debris barrier would be installed, followed by installation of the debris barriers.

Tunneling Excavation

The proposed inlet/outlet conduit tunnel would be excavated by conventional mining equipment and methods, which would be carried out in a series of repeated excavation steps using road-headers or mechanical excavators followed by temporary ground support and initial lining. A road-header is a boom-mounted cutting head, mounted on a crawler that cuts through rock face. Initial support systems would be installed during tunneling to provide support before, during, or immediately after excavation. Excavations for the launch pit at the tunnel portal would be in the range of 15 to 30 feet wide and about 30 to 50 feet long. Support for the portal excavation could include rock bolts and soil nails with shotcrete facing, and soldier pile and lagging with tiebacks or internal struts. Groundwater control measures would be applied proactively to manage groundwater inflows. For example, pre-excavation grouting could be applied in areas intercepting water bearing features to treat the rock mass ahead of the excavation.

New Outlet Yard Structure

A new outlet yard structure would be constructed at the tunnel portal at the toe of the dam after the tunnel has been completed and backfilled. The 48-inch-diameter inlet/outlet conduit in the tunnel bifurcates into two main lines at the outlet structure: one that connects to the NCP and

another that directs emergency release flows to an energy dissipation chamber and ultimately to the spillway plunge pool. A third line, the instream beneficial release line, continues from the 10-inch-diameter conduit in the tunnel to release flows into the stream release chamber, just downstream of the energy dissipation chamber. The new outlet yard at the toe of the dam would be approximately 720 square feet in area and enclosed with a fence. The outlet yard would house valves and associated control and electrical equipment. From the outlet yard, the City would be able to adjust instream beneficial flows, isolate the NCP from the inlet/outlet conduit, and make operation and emergency releases.

Construction of the new outlet yard would include excavation, concrete work, valving, and installation of the control system. The outlet yard could include both prefabricated and cast-in-place concrete elements. Pre-cast concrete would be transported to the construction site and positioned into place. Cast-in-place concrete would be poured into the specific formwork on the site and cured.

Control Building
A new control building will be placed adjacent to the existing inlet control house on the crest of the dam, similar to the existing control building. This building will house the hydraulic pressure unit and other control and electrical equipment. The structure itself has not been designed, but the preliminary design is an approximate 200-square-foot, concrete-masonry structure on a reinforced concrete slab. It could also be a prefabricated building.

Dam Seepage Discharge
The dam was constructed with seepage collection systems located at the base of the dam, along the east and west extents. Seepage is monitored in two weirs at the toe of the dam. Existing seepage is collected in a channel that is conveyed to the spillway plunge pool, which follows into Newell Creek. A new seepage monitoring point would be designed as part of the project because once the existing outlet structure is decommissioned, it would be buried along with the seepage weirs. The new seepage monitoring point would have two troughs in a well rather than the current exposed.

The construction of the seepage monitoring point would be performed in two phases. During construction of the new inlet/outlet works, a concrete seepage monitoring well would be placed downstream of the existing outlet structure, with the construction platform filled in around it. During the first phase, weir flow would continue to be measured at the existing weirs. The flow would then be collected into one or both seepage inlet pipes. It is expected that instream beneficial releases would also be discharged to one of these pipes and thereby be conveyed through the well to the spillway plunge pool during construction.

In the second phase of construction (described below), once the new outlet works are ready for commissioning, instream beneficial releases would be made at the new outlet structure to the stream release chamber. The seepage inlet pipes would be extended to the base of the embankment and connected to perforated seepage collector pipes at the base of the dam.

Newell Creek Pipeline

The existing 22-inch NCP, which was constructed in 1960, serves as both an inlet and outlet pipe to convey untreated water both to and from the reservoir and the San Lorenzo River, and from the reservoir for treatment at the City's Graham Hill Water Treatment Plant (GHWTP) and subsequent delivery to city customers. Approximately 2,000 linear feet of the NCP would be replaced from the toe of the dam to just upstream of the Newell Creek Access Road Bridge. The northern portion of the new NCP segment would be installed adjacent to the existing pipe in the narrow unpaved access road. In the southern portion of the project area, where the existing NCP is in a vegetated area west of the access road, the new NCP would be installed several feet west of the existing NCP. The replacement pipeline would cross Newell Creek just west of the spillway plunge pool and the new proposed culvert crossing within a trench protected by concrete. The replacement pipeline would be 30 inches in diameter and would be made of ductile iron pipe with restrained joints or fusible PVC.

The replacement pipeline would be installed using conventional (open cut) trenching with small excavators and loaders. The pipeline construction trench would be approximately 5 feet wide and 8 feet deep, and construction activities are expected to occur within an approximate 10 to 15-foot-wide construction corridor. Retaining walls may also be constructed in some areas along the route to prevent erosion of steep slopes adjacent to the access road.

The majority of the NCP, from just north of the concrete ford to the Newell Creek Access Road Bridge, would be constructed prior to construction of the new tunnel and inlet/outlet works with a temporary 12-inch or 16-inch diameter bypass pipe installed from the existing outlet structure to just north of the concrete ford, where it would connect into the new NCP. After the new outlet structure is in place and functional, a final 30-inch pipe segment would be installed to connect the new outlet structure to the new NCP, and the temporary pipe would be disconnected. The contract documents would allow the contractor to come up with the best alignment of the temporary bypass pipe that works with their construction sequencing.

The NCP would cross Newell Creek for a distance of approximately 65 feet just west of the new culvert crossing and would be within an approximately 5-foot wide by 5-foot deep trench protected by a concrete cap. A cofferdam would be installed at approximately 30 feet downstream of the culvert bridge, and the spillway plunge pool would be dewatered to a point in which the existing crossing would be dry. The cofferdam type would be identified by the construction contractor, but based on typical cofferdams, it is expected that it would either be an inflatable feature or possibly gravel-filled bags. Prior to the spillway plunge pool, the beneficial bypass flows would be routed to bypass the plunge pool and to discharge directly into Newell Creek. During this period, the existing beneficial release flow and seepage flows would be routed directly to Newell Creek instead of the spillway plunge pool. Upon completion of this construction phase, the beneficial release and seepage flows would be routed to the spillway plunge pool as currently exists. When taken out of service, the existing pipeline would be plugged at or near the outlet structure, and the decommissioned section of the NCP would be severed and capped and/or filled with concrete.

Access Road Improvements

Newell Creek Road functions as the access road to the dam crest. The project does not include provisions to improve the paved road prior to construction. Post construction, repairs to the pavement would be required to address damage resulting directly or indirectly from construction. From Newell Creek Road, access to the toe of the dam is currently provided by a dirt and gravel surfaced road that branches off of Newell Creek Road approximately 1,400 feet downstream from the dam crest (this branch of the road is referred to as Newell Creek Access Road). This approximately 14-foot wide access road would be regraded and topped with an aggregate base. The access road crosses the spillway plunge pool with a concrete ford and continues towards the seepage channel at the toe of the dam. The spillway crossing would be improved as described in the following subsection.

From the dam crest, equipment and materials can be taken along the right abutment via the emergency access road (Haul Road). Road widening and slope stabilization measures would be needed to allow open areas along the Haul Road to be used for staging. Without modification, some of the slopes on the ridge adjacent to the Haul Road could be unstable and cause road blockages or damage during construction. Slope stabilization measures could include rock slope protection such as cable, mesh, fencing, and rock curtains, slope roughening and terracing, or application of erosion control blankets or mats. Haul Road needs to remain open for emergency access vehicles; however, plans to close the road temporarily may be approved by the City on a case-by-case basis depending on time of year and fire hazard levels.

Spillway Plunge Pool Crossing

Access to the toe of the dam currently involves crossing a concrete ford that is located at the discharge point of the spillway plunge pool. When the reservoir is spilling, depending on the volume of spill, special equipment (large utility vehicle) is required to access the toe of the dam via the concrete ford or the ford is not crossable. A new culvert bridge crossing is proposed as part of the project to provide improved access to the new outlet structure and the toe of the dam. The new crossing consists of a culvert bridge with a roadway elevation of 388.5 feet. The new spillway bridge would consist of the following: precast, reinforced box culverts (five total), cast-in-place reinforced concrete retaining walls (four total), and cast-in-place reinforced concrete parapet and cut-off wall.

The span of the bridge would consist of five, pre-cast reinforced concrete box culverts laid down adjacent to each other to create a 60-foot span. Due to the orientation of the flow from the spillway pool to Newell Creek, the culverts would have a 45-degree skew to the roadway alignment. Cast-in-place retaining walls would be installed to contain the existing access road as it approaches and leaves the culvert bridge.

Once the NCP segment across Newell Creek is installed, the existing concrete ford would be excavated, and the concrete culvert bridge would be installed. The existing pipeline in this section may be taken out or filled with concrete. Once the culvert crossing bridge is in place, the downstream cofferdam and re-routed bypass flow would be removed to return flows into the spillway plunge pool and Newell Creek.

Beneficial Instream Flow Pipeline
At the outlet yard, the 10-inch pipe would reduce to a 6-inch pipe for making normal beneficial stream releases as currently provided (see section 2.4.2 of this opinion). The beneficial instream flows would be released into the stream release chamber and ultimately the spillway plunge pool via the 48-inch reinforced concrete pipe. Additionally, when the 48-inch inlet/outlet conduit is out of service, the 10-inch secondary carrier pipe could be used as a bypass to provide up to three million gallons per day to the NCP.

Utility Improvements
Electricity is currently provided to the existing control house at the crest of the dam and the utility poles that support existing power lines would remain in place. New electrical distribution equipment includes disconnect switches, a 480-volt (V) panel, a 120-V panel, and 480-to 120-V transformer. Once the new control house is operational, backup power can be provided by connecting a standby generator. Controls for the inlets would be located within the proposed dam crest control building near the existing control house or on the right abutment near the Haul Road. New 480-V power and fiber optic lines from the new panel in the new dam crest control building to the toe of the dam would be buried in a conduit duct bank at a depth of about two feet along the left groin of the dam (looking downstream). A new control panel would be located at the outlet yard.

Decommissioning Existing Inlet/Outlet Works
The existing inlet/outlet would be decommissioned once the replacement inlet/outlet system is operational. The sloping intake would be abandoned in place and the 30-inch and 36-inch conduits would be would be dewatered, plugged, and grouted. Decommissioning the existing inlet/outlet conduit would include dewatering, plugging, and grouting pipe line extending to all areas under the dam. After the existing inlet/outlet is decommissioned, excess material from the tunnel and portal could be used to bury the existing outlet structure and buttress the dam within a one-acre area at the lower embankment and toe of the dam.

Temporary Bypass for Continuous Beneficial Release Flows
At the toe of the dam, the City maintains a continuous instream beneficial release to Newell Creek comprised of a 4-inch pipe, valves, and a flow meter. This release would need to be maintained at all times during construction. A temporary bypass pipe would be installed between the existing outlet structure and Newell Creek downstream of the work area to provide continuous beneficial release flows during construction.

1.3.2 Staging Areas
Staging areas would be used for storage of materials and products, treatment and temporary storage of spoils, tunnel equipment laydown, boat launch, and potentially a concrete batch plant. Staging areas would be required for tunnel, outlet structure, and inlet construction. The staging areas are in various locations along Newell Creek Road, the outlet structure access road, the Haul Road, and along an existing road to the east bank of the reservoir. Relatively flat sections of the staging areas would be cleared and grubbed to provide usable space for staging of construction materials and equipment.

1.3.3 Access Routes

Access for vehicles carrying materials, equipment, and personnel to and from the construction area would be provided via several existing roadways in the project vicinity. The primary route for construction traffic would likely include State Route 17 to Mount Hermon Road, Graham Hill Road, State Route 9, Glen Arbor Road, and Newell Creek Road. Access to the toe of the dam is currently provided by a dirt and gravel-surfaced road that branches off of Newell Creek Road approximately 1,400 feet downstream from the dam crest. This access road crosses a concrete ford (a broad crested weir) at the spillway stilling basin and continues towards the seepage channel at the toe of the dam. As previously indicated, the road to the toe of the dam would be regraded and topped with an aggregate base, and the spillway crossing would be improved with installation of pre-cast reinforce concrete box culverts.

Another access road leads to the left embankment of the dam, crosses the spillway at the spillway bridge, and continues towards the crest of the dam that leads to the Haul Road on the right embankment. Road widening and slope stabilization measures would be needed to allow open areas along the Haul Road to be used for staging.

The Loch Lomond Recreation Area (LLRA) is located on the east side of the reservoir about 4,000 feet upstream of the dam crest, from which boats and barges are currently launched. The construction barge could be initially launched from the existing LLRA boat ramp and could be decommissioned from there at the end of construction. While some service boats may also use this launch; activity at this facility is expected to be minimal. Access to the LLRA is via a long, relatively narrow, steeply ascending road through residential areas with many tight curves.

As previously indicated, a temporary boat launch facility would likely be built on the right bank of the reservoir within Staging Area 1. To accommodate the temporary boat launch facility, construction grading is expected on the right bank of the reservoir. Although a specific design for this facility has not been developed, it is anticipated that sheet piles would be placed adjacent to shore and backfilled to create a pier. It is estimated that the temporary pier would cover a maximum of 600 square feet of water. A crane may be provided at Staging Area 7 on the low point on the east bank to load equipment and supplies onto boats in the reservoir.

Boats for accessing the construction barge would primarily be launched from this facility. The boat launch would be used periodically throughout construction and at the end of the construction during project commissioning and decommissioning of the existing inlet/outlet works. The construction barge could also be commissioned and decommissioned in the water via a crane stationed on the temporary boat launch facility. The construction barge would be temporary and be approximately 400 square feet in size.

1.3.4 Reservoir Operations during Construction

Loch Lomond is the City of Santa Cruz's only raw water storage reservoir. The City keeps the reservoir as full as possible in an effort to maintain a backup supply for critical drought conditions. Lowering the reservoir makes the water supply system more vulnerable to shortage

during extended dry periods or critically dry years. The reservoir is expected to be maintained in its normal operating range throughout construction.[1]

1.3.5 Schedule and Sequencing

Project construction would take approximately two years. A preliminary construction schedule was prepared in conjunction with the 50 percent Design Report that estimated an approximate two-year construction schedule, starting in the year 2021. The actual start date will be refined as final engineering plans are prepared, but the actual construction start date could be in mid-2020 with an estimated a completion date in mid-2022. There may also be an "accelerated" construction schedule in which some work activities/sequences are scheduled during consecutive evening/nighttime periods to complete a particular phase in a shorter amount of time. The anticipated construction sequence, which would be further developed by the selected contractor, is summarized below:

Year 1

1. Equipment would be mobilized to the site using ground transportation
2. Staging areas would be developed at the site
3. Bypasses for the NCP and instream beneficial flows would be constructed
4. The NCP replacement segment would be improved
5. Access roads to the outlet area would be improved
6. The construction platform at the toe of the dam would be developed
7. The spillway plunge pool culvert bridge would be installed
8. The temporary boat launch would be installed, and the silt curtains would be placed to contain the intake structure work area
9. The intake structure would be constructed in the reservoir from a barge
10. The launch pit would be extracted at the tunnel portal and tunnel excavation would commence

Year 2

1. The tunnel excavation would continue
2. The inlet/outlet conduit and carrier pipe would be installed in the tunnel and connected to the vertical intakes, and the tunnel would be backfilled
3. The control house for the inlets would be constructed on the crest of the NCD
4. The outlet structure would be constructed and connected to the inlet /outlet conduit, the carrier pipe, and the NCP
5. The new system would be tested, and the old inlet/outlet works would be decommissioned

Mitigation Project 3 (described below) will be constructed following the completion of the inlet/outlet replacement project, which is anticipated to occur in 2022 or 2023.

[1] The City of Santa Cruz's operation of Loch Lomond Reservoir for municipal water supply and instream flows to Newell Creek are currently being assessed by NMFS as part of the City's section 10(a)(1)(B) permit application and Habitat Conservation Plan. Therefore, the effects of current and future reservoir operations on listed species and designated critical habitats are not evaluated in this section 7 consultation.

1.3.6 Operations and Maintenance

Current operations and maintenance activities at the dam in addition to the primary inflow/outflow, include releasing a minimum of 1 cfs to Newell Creek, operational testing of the hydraulic system and shutoff valves, and monitoring seepage from the dam. Continuous flow releases and monthly seepage monitoring would continue during and after construction of the new inlet/outlet works.

Operations and maintenance for the new intakes and the inlet/outlet conduit system include inspections of the intakes and interiors of the conduit, operational testing. Operations and maintenance requirements for the new inlet/outlet works is anticipated to increase from current requirements because of the more complex design of the new system compared to the existing inlet/outlet. The new outlet would be in a fenced yard, and the new seepage monitoring location would be enclosed in a structure.

1.3.7 Proposed Conservation, Avoidance, and Minimization Measures

The City has proposed several conservation, avoidance, and minimization measures as part of the proposed action. These are described more fully in Section 3.6 of the biological assessment (Dudek 2018) and include the use of erosion and sediment control measures, minimum distances for storage and fueling of heavy equipment, fish capture and relocation, dewatering of the construction areas, and a dry-season work window. Once construction is complete, all temporary fills including access ramps and cofferdams, will be completely removed once construction is complete. All temporarily disturbed areas will be restored by replanting native vegetation using a vegetation mix appropriate for the site.

To compensate for unavoidable impacts to waters of the U.S. resulting from the construction platform, the spillway plunge pool crossing, and the NCP replacement, the City of Santa Cruz proposes three mitigation projects in the Newell Creek Watershed. These projects include:

i. Mitigation Project 1 – Riparian Vegetation Restoration. This project will include vegetation enhancement within 0.32 acres of the riparian zone along Newell Creek (outside of the impacted construction zone), as well as locations along the shoreline of Loch Lomond Reservoir.

ii. Mitigation Project 2 – Wetland Creation/Enhancement. This project will include establishment and enhancement of wetlands in upland areas upstream of Newell Creek Dam to compensate for impacts to non-fish bearing wetlands currently provided by dam seepage and other seasonal wetlands.

iii. Mitigation Project 3 – Instream Habitat Enhancement in Newell Creek. This project will enhance instream habitat conditions in Newell Creek by repairing or replacing four existing log weir structures that are no longer performing as intended (Holley 2010; City of Santa Cruz 2019). The log weir structures are located approximately 500 feet downstream of the spillway plunge pool.

Prior to implementation of Mitigation Project 3 a more detailed pre-project site evaluation, or habitat assessment, will be required and recommendations will be developed from the data

collected during the assessment. Once recommendations are made, a hydraulic analysis will be completed to assess structural changes in the channel using longitudinal and cross-sectional profile surveys. Habitat enhancement structures will be selected at locations in which modifying a transitional habitat unit in the reach can significantly enhance the function of that habitat unit (e.g. a poorly developed pool). Sites will also be evaluated for appropriate gradient, stream width, substrate, channel sinuosity, and bank characteristics, which all influence the stability of the installed structure. Final structure design will be determined after all habitat and hydro-geomorphic assessments are complete. The City of Santa Cruz anticipates the structures will include combinations of large redwood logs and/or root wads anchored with boulders and other appropriate materials consistent with California Salmonid Stream Habitat Restoration Manual (Flosi et al. 2010).

Implementation of Mitigation Project 3 will occur after the Newell Creek Dam Inlet/Outlet Replacement Project is completed (2022 or 2023). Approximately 400 feet of stream (or approximately 0.34 acres) will require dewatering during the summer/fall work window for approximately 4 weeks. Channel dewatering and fish capture and relocation activities will be required and will follow the same methods as described above (Section 1.3.1 Description of Project Components and Construction Approach).

We considered whether or not the proposed action would cause any other activities and determined they would not.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

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

The Corps determined the proposed action is not likely to adversely affect the CCC coho salmon ESU or its critical habitat. Our concurrence is documented in the "Not Likely to Adversely Affect" Determinations section 2.12.

2.1 Analytical Approach

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

(50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

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

The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The 2016 critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The 2019 regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the regulations (84 FR 44977), that definition does not change the scope of our analysis and in this opinion we use the terms "effects" and "consequences" interchangeably.

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

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

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the

conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential PBFs that help to form that conservation value.

This biological opinion analyzes the effects of the action on the threatened CCC steelhead Distinct Population Segment (DPS) (71 FR 834; January 5, 2006), and the designated critical habitats for the CCC steelhead DPS (70 FR 52488; September 2, 2005) and the CCC coho salmon (*O. kisutch*) Evolutionary Significant Unit (ESU) (64 FR 24049; May 5, 1999).

2.2.1 Status of the CCC Steelhead DPS

Historically, approximately 70 populations of steelhead existed in the CCC steelhead DPS (Spence et al. 2008; Spence et al. 2012). Many of these populations (about 37) were independent, or potentially independent, meaning they had a high likelihood of surviving for 100 years absent anthropogenic impacts (Bjorkstedt et al. 2005). The remaining populations were dependent upon immigration from nearby CCC steelhead DPS populations to ensure their viability (McElhaney et al. 2000, Bjorkstedt et al. 2005).

While historical and present data on abundance are limited, CCC steelhead numbers are substantially reduced from historical levels. A total of 94,000 adult steelhead were estimated to spawn in the rivers of this DPS in the mid-1960s, including 50,000 fish in the Russian River –the largest population within the DPS (Busby et al. 1996). Recent estimates for the Russian River are on the order of 4,000 fish (NMFS 1997). Abundance estimates for smaller coastal streams in the DPS indicate low but stable levels with recent estimates for several streams (Lagunitas, Waddell, Scott, San Vicente, Pudding, and Caspar creeks) of individual run sizes of 500 fish or less (62 FR 43937). Some loss of genetic diversity has been documented and attributed to previous among-basin transfers of stock and local hatchery production in interior populations in the Russian River (Bjorkstedt et al. 2005). In San Francisco Bay streams, reduced population sizes and fragmented habitat conditions has likely also depressed genetic diversity in these populations. For more detailed information on trends in CCC steelhead abundance, see Busby et al. 1996; NMFS 1997; Good et al. 2005; Spence et al. 2008; Williams et al. 2011; and Williams et al. 2016.

CCC steelhead long-term population trends suggest a negative growth rate, indicating the DPS may not be viable in the long-term. Populations that historically provided enough steelhead immigrants to support dependent populations may no longer be able to do so, placing dependent populations at increased risk of extirpation. However, because CCC steelhead remain present in most streams throughout the DPS, roughly approximating the known historical range, CCC steelhead likely possess a resilience that has slowed their rate of decline relative to other salmonid species. The 2005 status review concluded that steelhead in the CCC steelhead DPS remain "likely to become endangered in the foreseeable future" (Good et al. 2005). On January 5, 2006, NMFS issued a final determination that the CCC steelhead DPS is a threatened species, as previously listed (71 FR 834).

The most recent status update concludes that steelhead in the CCC DPS remain "likely to become endangered in the foreseeable future", as new and additional information available since Williams et al. (2011) does not appear to suggest a change in extinction risk (81 FR 33468; Williams et al. 2016).

2.2.2 Status of CCC Steelhead and CCC Coho Salmon Critical Habitat

In designating critical habitat, NMFS considers, among other things, the following requirements of the species: 1) space for individual and population growth, and for normal behavior; 2) food, water, air, light, minerals, or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for breeding, reproduction, or rearing offspring; and, generally; and 5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species (50 CFR 424.12(b)). In addition to these factors, NMFS also focuses on Physical or Biological Features (PBF)[2] and/or essential habitat types within the designated area that are essential to the conservation of the species and that may require special management considerations or protection (81 FR 7214).

PBFs for CCC steelhead critical habitat, and their associated essential features within freshwater include:

- Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;
- Freshwater rearing sites with:
    - Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
    - Water quality and forage supporting juvenile development; and
    - Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
- Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

PBFs for CCC steelhead critical habitat, and their associated essential features within estuarine areas include: areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

For CCC coho salmon critical habitat, the following essential habitat types were identified: 1) juvenile summer and winter rearing areas; 2) juvenile migration corridors; 3) areas for growth and development to adulthood; 4) adult migration corridors; and 5) spawning areas. Within these areas, essential features of coho salmon critical habitat include adequate: 1) substrate, 2) water quality, 3) water quantity, 4) water temperature, 5) water velocity, 6) cover/shelter, 7) food, 8) riparian vegetation, 9) space, and 10) safe passage conditions (64 FR 24029).

[2] NMFS previously used the term "Primary Constituent Elements", but has now shifted to using "Physical or Biological Features. The shift in terminology does not change the approach used in conducting a 'destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified primary constituent elements, physical or biological features, or both.

The condition of CCC steelhead and CCC coho salmon critical habitats, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that currently depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat[3]: logging, agriculture, mining, urbanization, stream channelization and bank stabilization, dams, wetland loss, and water withdrawals (including unscreened diversions for irrigation). Habitat impacts of concern include altered stream bank and channel morphology, elevated water temperature, lost spawning and rearing habitat, habitat fragmentation, impaired gravel and wood recruitment from upstream sources, degraded water quality/quantity, lost riparian vegetation, and increased sediment delivery into streams from upland erosion (Weitkamp et al. 1995; Busby et al. 1996; 64 FR 24049; 70 FR 37160; 70 FR 52488; NMFS 2012; NMFS 2016). Widespread diverting of rivers and streams, as well as the pumping of groundwater hydraulically connected to stream flow, has dramatically altered the natural hydrologic cycle in many of the streams within the CCC DPS and ESU, which can delay or preclude migration, dewater aquatic habitat, and degrade water quality. Stream channelization, commonly caused by streambank hardening and stabilization, represents a very high threat to instream and floodplain habitat throughout much of the designated critical habitat for both species, as detailed within the CCC coho salmon and CCC steelhead recovery plans (NMFS 2012 and 2016, respectively). Streambank stabilization confines stream channels and precludes natural channel movement, resulting in increased streambed incision, reduced habitat volume and complexity. Overall, the current condition of critical habitat for both CCC steelhead and CCC coho salmon is degraded, and likely cannot provide the conservation values necessary for recovery absent continued habitat restoration efforts.

2.2.3 Global Climate Change

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

The threat to CCC steelhead from global climate change will increase in the future. Modeling of climate change impacts in California suggests that average summer air temperatures are expected

[3] Other factors, such as over fishing and artificial propagation have also contributed to the current population status of these species. All these human induced factors have exacerbated the adverse effects of natural environmental variability from such factors as drought and poor ocean productivity.

to continue to increase (Lindley et al. 2007; Moser et al. 2012). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe et al. 2004; Moser et al. 2012; Kadir et al. 2013). Total precipitation in California may decline; critically dry years may increase (Lindley et al. 2007; Schneider 2007; Moser et al. 2012). Wildfires are expected to increase in frequency and magnitude (Westerling et al. 2011; Moser et al. 2012).

In the San Francisco Bay region[4], warm temperatures generally occur in July and August, but as climate change takes hold, the occurrences of these events will likely begin in June and could continue to occur in September (Cayan et al. 2012). Climate simulation models project that the San Francisco region will maintain its Mediterranean climate regime, but experience a higher degree of variability of annual precipitation during the next 50 years and years that are drier than the historical annual average during the middle and end of the twenty-first century. The greatest reduction in precipitation is projected to occur in March and April, with the core winter months remaining relatively unchanged (Cayan et al. 2012).

Estuaries may also experience changes detrimental to salmonids. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia et al. 2002, Ruggiero et al. 2010). In marine environments, ecosystems and habitats important to juvenile and adult salmonids are likely to experience changes in temperatures, circulation, water chemistry, and food supplies (Brewer and Barry 2008; Feely 2004; Osgood 2008; Turley 2008; Abdul-Aziz et al. 2011; Doney et al. 2012). The projections described above are for the mid to late 21st Century. In shorter time frames, climate conditions not caused by the human addition of carbon dioxide to the atmosphere are more likely to predominate (Cox and Stephenson 2007; Smith et al. 2007; Santer et al. 2011).

2.2.4 Life History of CCC Steelhead

Steelhead are anadromous forms of *O. mykiss*, spending some time in both fresh- and saltwater. The older juvenile and adult life stages reside in the ocean, until the adults ascend freshwater streams to spawn. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death (Busby et al. 1996; Moyle 2002). Although one-time spawners are the great majority, Shapovalov and Taft (1954) reported that repeat spawners are relatively numerous (17.2 percent) in California streams. Eggs (laid in gravel nests called redds), alevins (gravel dwelling hatchlings), fry (juveniles newly emerged from stream gravels), and other juvenile life stages all rear in freshwater until they migrate to the ocean where they reach maturity.

CCC steelhead are classified as "winter-run" steelhead because they emigrate from the ocean to their natal streams to spawn annually during the winter; although run times can extend into spring months (April and May) (Moyle 2002). Within the CCC steelhead DPS, adults typically enter freshwater between December and May, with peaks occurring in January through March (Fukushima and Lesh 1998). It is during this time that streamflow quantities (depths and velocities) are suitable for adults to successfully migrate to and from spawning grounds. The minimum stream depth necessary for successful upstream migration is about 13 centimeters (cm), although short sections with depths less than 13 cm are passable (Thompson 1972). More

[4] Both the San Francisco Bay and Monterey Bay regions exhibit similar Mediterranean climate patterns. The action areas are located within the Monterey Bay region.

optimal water velocities for upstream migration are in the range of 40-90 cm/s, with a maximum velocity, beyond which upstream migration is not likely to occur, of 240 cm/s (Thompson 1972).

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

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

Although variation occurs, in coastal California juvenile steelhead usually rear in freshwater for 1-2 years until they enter the ocean as smolts. In many coastal populations, steelhead juveniles will rear for extended periods in lagoon or estuarine habitats, particularly seasonally closed lagoons. Juveniles that rear in lagoon environments have been found to achieve superior growth rates, relative to upstream fish of the same cohort, and can therefore disproportionally represent future adult steelhead returns. Steelhead smolts in California range in size from 120 to 280 mm (fork length) (Shapovalov and Taft 1954; Barnhart 1986). CCC steelhead smolts emigrate episodically from freshwater during late winter and throughout spring, with peak migrations occurring in April and May (Fukushima and Lesh 1998).

2.3 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

The project action area includes portions of Loch Lomond Reservoir (including a portion of the

left bank of the reservoir), the right abutment of Newell Creek Dam, the area just downstream of the dam including the existing spillway plunge pool, Newell Creek (including portions of its bed, banks, and riparian zone) extending a distance of 1,000 feet downstream of the dam, a bypass channel (also known as the seepage channel) that conveys water from the outlet to the spillway plunge pool and Newell Creek, and finally the pipeline alignment along Newell Creek Road (Figure 1). Inclusion of 1,000 feet of Newell Creek downstream of the dam is due to potential increases in suspended sediment, or turbidity, from construction and to inclusion of Mitigation Project 3, which is located between approximately 500 and 900 feet from the dam.

2.4 Environmental Baseline

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

2.4.1 Description of the San Lorenzo River Watershed

The San Lorenzo River watershed, including Newell Creek, drains approximately 138 square miles and is the largest drainage in the Santa Cruz Mountains Diversity Stratum (NMFS 2012; 2016). Land cover is comprised of approximately 62 percent coniferous forest, 21 percent shrub, 16 percent urban, and 1 percent each as agriculture and grassland communities. Urban and residential development, timber harvest, road construction, water supply, and flood control activities have had a collective adverse effect on the quality and quantity of spawning, rearing, and migratory habitats for steelhead and coho salmon in the San Lorenzo River watershed (NMFS 2012; 2016). Currently, extensive suburban residential development along State Route 9, selective timber harvesting, quarry activities, agriculture, and ranching operations are all present in the watershed. In addition, there are several large state and municipal parks and recreation areas in the watershed that are used for conservation and public recreation. Streams in the San Lorenzo River watershed supply water to residents in the cities of Santa Cruz and Scotts Valley and surrounding unincorporated areas. In the San Lorenzo Valley, numerous municipal surface water diversions and groundwater wells, as well as other riparian and appropriative diversions, are scattered throughout the upper watershed. Approximately 90 percent of the watershed is privately owned while the remaining 10 percent is public and consists of state, county, and city parks, and the University of California at Santa Cruz.

2.4.2 Description of the Newell Creek Subwatershed

Newell Creek is a perennial tributary to the San Lorenzo River. Its confluence with the San Lorenzo River is near the town of Ben Lomond, approximately 1.7 miles downstream of the Newell Creek Dam. Newell Creek Dam, constructed in 1960, is a 195-foot earthen dam with a storage capacity of approximately 8,646 acre-feet. The City of Santa Cruz owns and operates Loch Lomond Reservoir (425 acres), and the Newell Creek Watershed Lands (2,880 acres)

adjacent to the reservoir. Downstream of the reservoir, Newell Creek is relatively undisturbed for approximately 0.8 miles, then is bordered by residential development for the next 0.9 miles to the confluence with the San Lorenzo River. Reservoir operations include a year round minimum release requirement of 1 cfs and release of the natural flow during July/August (due to the fully appropriated status of the San Lorenzo watershed) if the natural inflow exceeds 1cfs . When the reservoir fills, spillway releases plus a small contribution from the watershed area downstream of the dam result in downstream flows that are similar to reservoir inflow levels (Dudek 2019). City records for the period 1961 to 2018 indicate that the reservoir has spilled in 36 out of the 58 years (Dudek 2019).

Channel conditions and salmonid habitat quality vary along the 1.7 miles of creek below the dam to the confluence with San Lorenzo River. In August 2007, a consultant for the City of Santa Cruz conducted a stream habitat and fish population survey in the reaches of Newell Creek downstream of Newell Creek Dam (Hagar 2007). Hagar (2007) summarizes the general range of creek channel conditions below the dam as follows:

"*There are three distinct reaches of Newell Creek downstream of Newell Reservoir, each with different aquatic habitat characteristics and fish populations. A lower reach, approximately 0.85 miles in length is accessible to anadromous fish and supports steelhead/rainbow trout (Oncorhynchus mykiss) and Pacific lamprey. A middle reach of approximately 0.59 miles is dominated by bedrock substrate and supports O. mykiss that may be either anadromous or resident in the lower part of the reach. There are bedrock formations in this reach that present numerous potential migration obstacles and one likely passage barrier. The uppermost reach has less suitable habitat for O. mykiss which includes less extensive and shallower pools, less instream cover, and less potential spawning area. There is a very sparse population of O. mykiss in the uppermost reach, likely a resident (non-anadromous) population, with apparently low levels of production and reproductive success.*"

In 2010, staff from NMFS conducted an assessment of the geomorphological processes and changes to aquatic habitat conditions for salmonids in Newell Creek (Holley 2010). Regarding general habitat conditions in the reaches accessible to anadromous salmonids, the conclusions reached in the 2010 assessment were consistent with those described above by Hagar (2007). In addition, Holley (2010) remarked on the following regarding channel incision and substrate quantity and quality:

"*The complete disruption of sediment input to the upper and bedrock reaches and resulting incision has severely impacted salmonid habitat. It is not known how much, if any, bedrock was exposed in the upper and bedrock reaches before the construction of Loch Lomond Dam. However, it is clear that channel incision throughout these two reaches has eliminated most bed material and further exposed bedrock outcroppings which have limited pool depth.*"

2.4.3 Status of Critical Habitat and CCC Steelhead in the Action Area

The following sections provide site-specific descriptions of current habitat conditions as assessed by Dudek (2018; 2019). Other habitat attributes are referenced from Hagar (2007), Holley (2010), Hagar et al. (2017), D.W. Alley and Associates (2019), and through personal communications with Don Alley, May 2019.

2.4.3.1 Newell Creek Access Road Bridge Scour Rehabilitation Project

Status of Habitat

In January 2019 a reconnaissance-level survey of habitat conditions was conducted through the action area. The results of this survey were also consistent with previous surveys of Newell Creek, which concluded that the upper reach (including the action area) has less extensive and shallower pools, less instream cover, and less potential spawning area than the lower reaches (Hagar 2007; Holley 2010). Overall, the quality of substrate in the upper reaches of Newell Creek below the dam is degraded based on a high degree of armoring in pool tails and riffles (i.e., dominated by larger and more angular cobbles and boulders) and the lack of overall sediment recruitment (Holley 2010).

Riparian canopy through the action area is relatively dense (≥80 percent) and consists of mixed conifer, coast live oak, California bay, big-leaf maple, and alder (Hagar 2007). From the dam and downstream through the action area, Hagar (2007) found pool escape cover to be low with only 13 percent of pools with 20 percent or more of the habitat unit providing cover. As found throughout Newell Creek, the channel in the action area is incised, which is largely attributed to the interruption of sediment from the upper watershed by Newell Creek Dam (Holley 2010).

As introduced above, there are several bedrock chute features that are major migratory impediments to salmonid passage in Newell Creek (Hagar et al. 2017). The most severe of the features is located approximately 0.5 miles downstream of the action area. Modeling of this bedrock feature for fish passage predicted that adult steelhead may only be able to pass during flows of approximately 200-325 cfs. Stream flows in Newell Creek that meet this range are rare, and therefore Hagar et al. (2017) concluded that the bedrock structure is the effective limit of anadromy for steelhead in Newell Creek. Although successful passage would be rare and likely limited to only the fittest of adult steelhead, juvenile *O. mykiss* within the action area at the time of construction may consist of anadromous offspring. Due to their size and dimensions and the flow velocities over the bedrock chute, the feature is considered a total barrier for coho salmon, which have poorer jumping/swimming abilities than that of adult steelhead (Alley et al. 2004; Hagar 2014).

On September 5 and 6, 2019, streamflow in Newell Creek at the Access Road Bridge site was approximately 1.2 cfs, water temperatures were 12ºC, and water clarity was high. Habitats consisted of a backwater pool and run habitat downstream of the bridge, a deeper scour pool (with an approximate maximum depth of 3.5 feet) beneath the bridge, and a low-gradient riffle and glide transition upstream of the bridge (Hagar 2019).

Following fish relocation and dewatering, construction of the Newell Creek Access Road Bridge Rehabilitation Project was completed as proposed between September 6 and October 14, 2019. This included the installation of ungrouted rock and gravel layer fill to address scour deficiencies beneath one of the bridge pier footings, and the installation of large logs, tree rootwads, with anchor boulders into and along the streambank upstream of the bridge.

Status of Salmonids

In most years since 1997, D.W. Alley and Associates has conducted fall monitoring of juvenile salmonid abundance and habitat quality at several sites throughout the San Lorenzo River Watershed (Alley 2019). This has included one site in Newell Creek (site 16) which is located in the downstream portion of Newell Creek (downstream of the two action areas). Since 1997, annual densities of juvenile *O. mykiss* at this site show a negative trend, with a mean density of 31.2 fish per 100 feet, and a range of 2.8 to 94.9 fish per 100 feet in 2015 and 1997, respectively (Figure 2). In all years, including sampling in the early 1980s, no juvenile coho salmon have been observed or collected in Newell Creek (Don Alley, personal communication, May 2019).

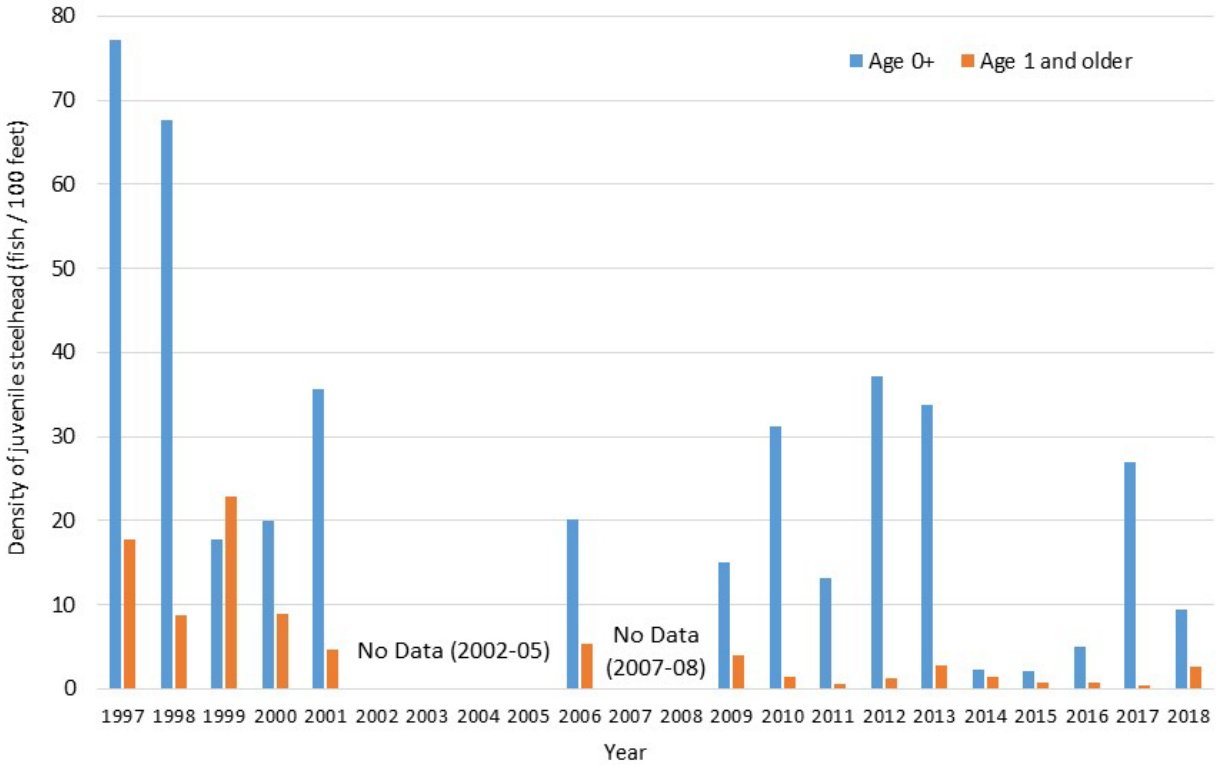

Figure 2. Densities (# of fish per 100 feet of stream) of juvenile *O. mykiss* age 0+ and age 1 and older in Newell Creek (site 16) during fall, 1997-2001; 2006; 2009-2018 (data source: Alley 2019).

In August 2007, several sites within each of the three reaches described above by Hagar (2007) were sampled by backpack electrofishing. Juvenile *O. mykiss* were captured in all three reaches. Average density for *O. mykiss* was 21 fish per 100 feet in the lower reach (below the action area), 15 fish per 100 feet in the middle (bedrock) reach (also below the action area), and 2 fish per 100 feet in the upper reach (within the action area). Precise age determinations of the fish collected were not made, however the majority of the *O. mykiss* captured were assumed to be young-of-the-year (age 0+) based on size distribution, except for the upper reach where none of the captured fish were presumed to be age 0+ (Hagar 2007). No juvenile coho salmon were observed or collected during the 2007 surveys.

On September 5 and 6, 2019, fish relocation and channel dewatering activities were implemented for the Newell Creek Access Road Bridge Rehabilitation Project. A total of 51 juvenile steelhead (or non-anadromous rainbow trout) were collected within 170 feet of Newell Creek (30 fish per 100 feet). No juvenile coho salmon were found. All but one of the juvenile steelhead were between 50 and 99 mm fork length (average approximately 75 mm), with one additional fish approximately 190 mm (Hagar 2019). Of the 51 steelhead observed and collected, 3 died (2 by electrofishing, and 1 during channel dewatering).

The observed steelhead abundance was more than twice the projected abundance for the action area, and therefore take was exceeded. To project steelhead abundance and incidental take for the project, NMFS utilized the only reach-specific data available (from August 2007, as described above) and assumed a 5-fold increase (from 2 to 10 fish per 100 feet of stream) to account for potential annual variability. NMFS also expected mortality rates to be low, or one percent or less of the observed total number of fish for both the fish relocation and channel dewatering (or no more than 2 fish).

While incidental take was exceeded, the abundance of juvenile steelhead within the action area suggests either (1) streamflow conditions during the winter of 2018-19 (a wet year) were suitable for successful migration and spawning of adult steelhead upstream of the bedrock shelf impediment, or (2) extant, non-anadromous rainbow trout successfully reproduced in the vicinity of the action area. The densities observed in September 2019 (approximately 30 fish per 100 feet) were similar to the long-term average densities observed between 1997 and 2018 (31 fish per 100 feet) in Newell Creek downstream of the bedrock shelf impediment (Alley 2019). The loss of an additional steelhead (total of 3) is not expected to diminish the recovery potential for the San Lorenzo River steelhead population or the CCC steelhead DPS.

These results provide a more current and accurate depiction of the potential carrying capacity of *O. mykiss* in this reach of Newell Creek. These data will be used to update our projections for incidental take of CCC steelhead for the Newell Creek Inlet/Outlet Replacement Project as described below.

2.4.3.2 Newell Creek Dam Inlet/Outlet Replacement Project

Status of Habitat

In June 2018, the City's consultant conducted a site assessment of stream habitat in Newell Creek within a 1,000-foot section of the creek immediately downstream of the spillway plunge pool. Since all of the construction activities within and adjacent to the creek would occur at and immediately below the spillway plunge pool, any impacts to the stream channel, associated habitat, and potential water quality would likely occur within this 1,000-foot section.

In general, habitat conditions within this reach are similar to the conditions described above for the Newell Creek Access Road project site and are consistent with previous surveys of Newell Creek (Hagar 2007; Holley 2010; Dudek 2019). As described above, the quantity of suitable spawning substrate (gravel to small cobble) is limited in the reach immediately below the dam

due to interception of sediment from the remainder of the watershed upstream of the reservoir. Riparian canopy is relatively dense (≥80 percent) and consists of mixed conifer, coast live oak, California bay, big-leaf maple, and alder riparian.

Status of Salmonids
Prior to 2019, site, or reach-specific assessments of juvenile salmonid presence and abundance were not available – see above for a description of past data on abundance in other reaches of Newell Creek from Hagar 2007 and Alley (2019). Therefore, the abundance of *O. mykiss* in the upper-most reaches of Newell Creek downstream of Newell Creek Dam were anticipated to be low due to poor access caused by the bedrock chute formations farther downstream as well as degraded spawning habitat quality (Hagar 2007; Holley 2010). These projections of low abundance were supported by the observed low abundance by Hagar (2007). However, as outlined above, fish relocation and channel dewatering activities conducted in Newell Creek in September 2019, just downstream of the action area revealed much higher juvenile steelhead (or non-anadromous rainbow trout) densities (30 fish per 100 feet) (Hagar 2019).

NMFS assumes juvenile steelhead abundance within the Newell Creek Dam Inlet/Outlet Replacement Project action area could be as high or higher (earlier in summer) as observed during September 2019 (Hagar 2019). Using the 2019 fish abundance data and considering the lengths of habitats proposed for dewatering for the project (200 feet of Newell Creek, 150 feet of deep plunge pool, and 400 feet of Newell Creek for Mitigation Project 3), NMFS estimates as many as 40 juvenile steelhead per 100 feet may be present (60 per 100 feet for the plunge pool), or a total of 330 individuals.

Coho salmon are not expected to be in the action area for either project. This is due to the deteriorated condition of the San Lorenzo River population and a lack of recent evidence of successful reproduction (NMFS 2012; Williams et al. 2016), and the consistent lack of observations of juvenile coho salmon in best habitat available in Newell Creek in recent decades (Don Alley, personal communication, May 2019).

2.4.4 Previous Section 7 Consultations in the Action Area

Pursuant to section 7 of the ESA, NMFS has completed the following interagency consultations that have occurred, or may have the potential to occur, within the action area of this Project.

Newell Dam Intake Gate Repairs (NMFS PCTS# SWR-2011-716, ARN# 151422SWR2011SR00141)
NMFS and the Corps completed informal section 7 on a City of Santa Cruz proposal, and a concurrence letter was issued on June 21, 2011. The proposal included replacement of existing sluice gate intake structures on Newell Creek Dam and dredging of sediment deposits within proximity of the intakes for deposit elsewhere in the reservoir. NMFS analyzed the effects of the proposed action and concluded the action was not likely to adversely affect CCC steelhead or the designated critical habitats for CCC steelhead or CCC coho salmon. NMFS concluded the project would have no effect on CCC coho salmon due to the deterioration of the San Lorenzo River population, and the lack of observations of coho salmon in Newell Creek in recent decades.

Research or Enhancement Permits
NMFS' Section 10(a)(1)(A) research and enhancement permits and section 4(d) limits or exceptions could potentially occur in the Newell Creek watershed. Salmonid monitoring approved under these programs include redd/carcass surveys, smolt trapping, and sampling of juvenile abundance. In general, these activities are closely monitored and require measures to minimize take during the research activities. NMFS has analyzed these activities and determined that they would not jeopardize the CCC steelhead DPS or CCC coho salmon ESU nor would they destroy or adversely modify designated critical habitats.

2.5 Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered 50 CFR 402.17(a) and (b).

The proposed activities that are likely to affect CCC steelhead and designated critical habitats include fish collection and relocation, temporary stream dewatering, temporary increases in suspended sediment, temporary reductions in riparian vegetation, and the permanent loss of a small amount of stream channel benthic habitat.

2.5.1 Fish Collection and Relocation

Fish relocation activities pose a risk of injury or mortality to juvenile salmonids. Any fish collecting gear, whether passive (Hubert 1996) or active (Hayes *et al.* 1996), has some associated risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish capture varies widely, depending on the methods used, the ambient conditions, and the expertise of the field crew. Since fish relocation activities would be conducted by qualified and NMFS-approved fisheries biologists, direct effects to, and mortality of juvenile salmonids during capture would be minimized.

Although sites selected for relocating fish should have similar water temperature as the capture sites and are expected to have adequate habitat available, in some instances relocated fish may endure short-term stress from crowding at the relocation sites. Relocated fish may have to contend with other fish causing increased competition for available resources such as food and habitat area. Frequent responses to crowding by steelhead include emigration and reduced growth rates (Keeley 2003). Some of the fish released at the relocation sites may choose not to remain in these areas and move either upstream or downstream to areas that have more vacant habitat and a lower density of steelhead. As each fish moves, competition remains either localized to a small area or quickly diminishes as fish disperse.

Dewatering of the Newell Creek Dam plunge pool (approximately 150 feet long) and a portion of the creek channel immediately below the plunge pool (approximately 200 feet long) will be necessary for construction during Year 1 of the project for a total of approximately 350 feet.

Prior to dewatering, fish collection and relocation activities will be conducted to avoid direct mortality during construction and minimize the possible stranding of steelhead.

Using the numbers collected by Hagar (2019) for the Newell Creek Access Road Rehabilitation Project (30 fish per 100 feet) and considering the potential for annual variation NMFS anticipates juvenile steelhead abundance may be as high as 40 fish per 100 feet in Newell Creek. Because the spillway plunge pool offers superior habitat conditions (larger area and deeper) the abundance, or density, of fish may be even higher, or up to 60 fish per 100 feet. NMFS estimates up to 170 juvenile steelhead may be present within the areas proposed for dewatering. This includes an estimate of 80 fish in the 200-foot section of Newell Creek downstream of the plunge pool, and as many as 90 fish in the 150-foot long plunge pool.

To implement Mitigation Project 3 (replacement or repair of existing instream wood structures), the City of Santa Cruz will dewater approximately 400 feet of Newell Creek. Using the numbers collected by Hagar (2019) and considering the potential for annual variation in abundance, NMFS estimates up to 160 juvenile steelhead will be present in the proposed dewatered reach.

Implementing proposed avoidance and minimization measures is expected to reduce injury and mortality to juvenile salmonids. A qualified biologist, experienced in diversion and dewatering activities, will be on-site during dewatering operations to monitor placement of berms, capture fish, and relocate then to the nearest suitable habitat. NMFS estimates injury and mortality will not exceed 2 percent of the juvenile steelhead present during collection activities. If injury and mortality rates reach maximum levels, no more than 4 steelhead are expected to be injured or killed during capture and relocation efforts for the inlet/outlet replacement project, and no more than 4 steelhead are expected to be injured or killed during relocation efforts for Mitigation Project 3.

2.5.2 Dewatering

The project will require dewatering of habitats within the action area. Isolation and dewatering of the work area is expected to cause temporary loss, alteration, and reduction of aquatic habitat, and may result in mortality of any salmonids that avoid capture during fish relocation activities. Steelhead juveniles within these work areas may be injured or killed by concentrating or stranding them in residual wetted areas, or entrapping them within the interstices of channel substrate where they may not be seen by fish relocation personnel. Steelhead juveniles that avoid capture in the project work area will likely die due to desiccation or crushing.

Dewatering operations may affect steelhead by temporarily preventing juvenile steelhead from accessing the area for forage; and dewatering activities may affect the function of critical habitat by reducing forage for juvenile steelhead in the dewatered area. Benthic (bottom dwelling) aquatic macroinvertebrates are an important food source for salmonids; they may be killed, or their abundance reduced when creek habitat is dewatered (Cushman 1985). However, effects to aquatic macroinvertebrates resulting from stream flow diversions and dewatering will be temporary because construction activities will be relatively short-lived. Rapid recolonization, typically within one to two months, of disturbed areas by macroinvertebrates is expected following re-watering (Cushman 1985; Thomas 1985; Harvey 1986). For this reason, we expect the function of critical habitat will return to its pre-project level before adults and smolts use the

action area for migration. In addition, the effect of macroinvertebrate loss on juvenile salmonids is likely to be negligible because food from upstream sources (via drift) would be available downstream of the dewatered areas via stream flow diverted around the project work site or from terrestrial sources. Thus, NMFS expects fish will be able to find food and cover outside of the action area as needed to maintain their fitness during project construction.

Dewatering and fish relocation will be necessary only during Year 1 of project construction. Fish relocation efforts are expected to be effective at removing most, if not all, fish from the work area. NMFS typically expects the number of fish that may evade capture and are left within the area to be dewatered will be very low, or no more than one percent of the fish within the action area. However, here the complex and deep plunge pool area and the coarse substrate throughout the stretch of Newell Creek may offer extensive areas for small, juvenile fish to hide and evade capture. Therefore, NMFS expects the number of fish that evade capture may reach up to 3 percent of the pre-relocation abundance to evade capture and relocation, or no more than 5 juvenile steelhead will be killed during dewatering for this project. Dewatering of 400 feet of Newell Creek for the construction of Mitigation Project 3 may result in the mortality of no more than 5 fish.

The temporary loss of up to approximately 400 linear feet per year[5] of instream habitat (including the plunge pool) during construction is not expected to permanently impair designated critical habitat because aquatic and riparian habitat at the site would be returned to pre-project conditions within a couple of months following removal of the water diversion system and the habitat quality within the action area is marginal compared to stream reaches downstream of the action area. NMFS expects fish will be able to find food and cover outside of the action area as needed to maintain their fitness during project construction. Therefore, steelhead are not anticipated to be exposed to a reduction in food sources from the temporary reduction in macroinvertebrates as a result of dewatering activities. Furthermore, all dewatering materials will be removed by October 15 (unless extended in agreement with NMFS), so adults and smolts will not experience delay in their migration as a result of dewatering activities.

2.5.3 Water Quality: Increases in Suspended Sediment and Other Containments

Suspended Sediment - Sediment can affect fish in a variety of ways. High concentrations of suspended sediment can disrupt normal feeding behavior and efficiency (Cordon and Kelley 1961; Bjornn et al. 1977; Berg and Northcote 1985), reduce growth rates (Crouse et al. 1981), and increase plasma cortisol levels (Servizi and Martens 1992). High and prolonged turbidity concentrations can reduce dissolved oxygen in the water column, result in reduced respiratory functions, reduce tolerance to diseases, and can also cause fish mortality (Sigler et al. 1984; Berg and Northcote 1985; Gregory and Northcote 1993; Velagic 1995; Waters 1995). Even small pulses of turbid water can cause salmonids to disperse from established territories (Waters 1995), which can displace fish into less suitable habitat and/or increase competition and predation. Increased sedimentation can fill pools thereby reducing the amount of potential cover and habitat

[5] The Newell Creek Dam Inlet/Outlet Replacement Project will include channel dewatering on two occasions – for the inlet/outlet replacement (approximately 350 feet), and for the implementation of Mitigation Project 3 (approximately 400 feet). The two areas do not overlap spatially (the 400 foot section is located downstream) and they will not be conducted concurrently.

available, and smother coarse substrate particles which can impair macroinvertebrate composition and abundance (Sigler et al. 1984; Alexander and Hansen 1986).

Construction activities related to the Newell Creek Dam Inlet/Outlet Project will result in disturbance to the creek bed and banks and portions of the Loch Lomond Reservoir due to equipment access, channel/reservoir bed grading and fill placement, and the installation and removal of dewatering facilities. Specifically, these activities include construction of the new inlet structure in the reservoir, a new inlet/outlet conduit tunnel (including grading to create the construction pad at the foot of the dam), installation of a new culvert crossing over the spillway plunge pool, and replacement of a portion of the NCP across Newell Creek. In addition, after the inlet/outlet replacement is complete, construction of Mitigation Project 3 is expected to result in similar channel disturbances. These types of construction activities have been shown to result in temporary increases in turbidity (reviewed in Furniss et al. 1991; Reeves et al. 1991; Spence et al. 1996).

Although the site will be dewatered prior to construction, disturbed soils may become mobilized when the site is re-watered following construction and during subsequent high flow events. NMFS anticipates these activities would affect water quality and critical habitat in the action area in the form of small, short-term increases in turbidity during re-watering and subsequent higher flow events during the first winter storms post-construction.

Although chronic elevated sediment and turbidity levels may affect steelhead and critical habitat, the temporary increases in sedimentation and turbidity resulting from this project are not expected to rise to levels sufficiently high enough to adversely affect steelhead or critical habitat. Sedimentation and turbidity are most likely to increase during construction and removal of water diversion structures as well as during post-construction re-wetting of the channel. The City, or its consultants, will implement avoidance and minimization measures at each stage of construction to prevent the mobilization of sediments and reduce or eliminate impacts to steelhead and critical habitat (Dudek 2019). With the implementation of these measures (which also include the use of silt curtains during excavation and temporary pier construction in the reservoir), NMFS anticipates any resulting elevated turbidity levels would be small and only occur for a short time, well below levels and durations shown in the scientific literature as causing injury or harm to salmonids (see for example Sigler et al. 1984 or Newcombe and Jensen 1996) or their prey.

NMFS expects any sediment or turbidity generated by the project would not extend more than 1,000 feet downstream of the work site based on the site conditions (including minimal stream flows of 1 cfs) and the methods used to control sediment and turbidity. NMFS does not anticipate harm, injury, or behavioral impacts to CCC steelhead associated with exposure to elevated suspended sediment levels resulting from project activities. Regarding critical habitat, the temporary exposure of 1,000 feet of channel to increased sedimentation or turbidity is not expected to reach the scale where the physical or biological features of critical habitat will be altered, and therefore the ability of critical habitat to support listed species' conservation needs in the action area will be maintained.

Other Contaminants - Construction operations in, over, and near surface water have the potential to release debris, hydrocarbons, concrete, and similar contaminants into surface waters. Potential

contaminants that could result from projects like these include wet and dry concrete debris, fuel and lubricant for construction equipment, and various construction materials. If introduced into the aquatic habitats, debris could impair water quality by altering the pH, reducing oxygen concentrations as the debris decompose, or by introducing toxic materials such as hydrocarbons or metals into the aquatic habitat. Oils and similar substances from construction equipment can contain a wide variety of polynuclear aromatic hydrocarbons (PAHs) and metals. PAHs can alter salmonid egg hatching rates and reduce egg survival as well as harm the benthic organisms that are a salmonid food source (Eisler 2000).

Use of heavy equipment and storage of materials is required for the construction of the NCP and culvert crossing as well as the construction of instream habitat structures for Mitigation Project 3. As a result, if not properly contained, contaminants (e.g., fuels, lubricants, hydraulic fluids, concrete) could be introduced into the water system, either directly or through surface runoff. The effects described above for other contaminants (oils, fuels, grease) have the potential to temporarily degrade habitat and harm exposed fish. However, the project includes avoidance and minimization measures to address spills and prevent the introduction of construction debris and contaminants into the action area (Dudek 2018). Due to these measures, conveyance of toxic materials into Newell Creek during project implementation is not expected to occur and the potential for the project to degrade water quality and harm CCC steelhead and critical habitats is improbable.

2.5.4 Impacts to Wetland Habitats

Construction activities are expected to result in unavoidable temporary and permanent impacts to wetlands due to dewatering (see above), channel fill and vegetation clearing.

Riparian vegetation helps maintain stream habitat conditions necessary for steelhead. Riparian zones serve important functions in stream ecosystems such as providing shade (Poole and Berman 2001), sediment storage and filtering (Cooper et al. 1987; Mitsch and Gosselink 2000), nutrient inputs (Murphy and Meehan 1991), water quality improvements (Mitsch and Gosselink 2000), channel and stream bank stability (Platts 1991), source of woody debris that creates fish habitat diversity (Bryant 1983; Lisle 1986; Shirvell 1990), and both cover and shelter for fish (Bustard and Narver 1975; Wesche et al. 1987; Murphy and Meehan 1991). Riparian vegetation disturbance and removal can degrade these ecosystem functions and impair stream habitat. Where riparian vegetation is impaired, steelhead may be exposed to poor shade, substrate, water quality, habitat diversity, cover, and shelter. These habitat impairments have the potential to limit or preclude successful spawning and rearing, reduce adult migration success, and expose juveniles and smolts to increased predation.

The Newell Creek Dam Inlet/Outlet Replacement Project will result in temporary and permanent impacts to wetland habitats including vegetation and in-channel habitats. These impacts are largely due to fill for new structures, temporary dewatering (described above) and alteration of the channel bed and banks while dewatered. In total, an estimated 228 linear of wetlands (which equates to 1.51 acres) will be permanently impacted with an additional 0.12 acres of temporary impacts (Table 3). Wetland habitat types that are accessible to salmonids include the spillway plunge pool, Newell Creek below the plunge pool, and potentially the perennial drainage (seepage from the dam). Of these habitats, a total of 0.11 acres will be permanently filled with an

additional 0.09 acres that will experience temporary impacts. Vegetation removal will include up to 7 coast redwoods that are greater than 24 inches DBF. However, these trees are located in areas where they would be unlikely to contribute to future in-channel large wood recruitment.

The permanent loss of 0.11 acres of habitat will result in a reduction of rearing space and potential food resources available for CCC steelhead that may utilize the action area or portions of the creek immediately downstream (invertebrate drift) of the action area for rearing. Because the action area is located at the upstream extent of possible anadromous habitat in Newell Creek, NMFS expects it will take some time for any juvenile steelhead relocated from the action area to return at which time, densities are expected to remain low (if any). NMFS also expects the small number of steelhead in the creek immediately downstream of the action area will be able to access sufficient food resources within those areas from either benthic or terrestrial sources. Based on the above, the minor loss of accessible habitat is not expected to reach the scale where any physical or biological features of critical habitat will be altered, and therefore the ability of critical habitat to support conservation needs of steelhead and coho salmon in the action area will be maintained.

Table 3. Project components and associated impacts to wetland habitats.

Project Component	Wetland Habitat	Impact Type	Linear Feet of Permanent Impact	Acreage of Permanent Impact	Linear Feet of Temporary Impact	Acreage of Temporary Impact
Inlet Structure	Reservoir	Fill for construction of 3 inlets	N/A	0.02	N/A	N/A
Placement of dredged material	Reservoir	Placement of dredged material in thalweg of reservoir.	N/A	1.3	N/A	N/A
Construction Platform	Perennial Drainage	Fill for construction platform	153	0.02	N/A	N/A
	Wetland Seep	Fill for construction platform	N/A	0.03	N/A	N/A
	Wetland Seep	Fill for construction platform	N/A	0.01	N/A	N/A
	Spillway Plunge Pool	Fill for energy dissipater	N/A	0.01	N/A	N/A
	Ephemeral Drainage	Fill for construction platform	15	0.01	N/A	N/A
Spillway Plunge Pool Crossing and NCP Replacement	Spillway Plunge Pool	Fill for culvert bridge and replacement pipeline	N/A	0.03	N/A	0.05
	Wetland Seep	Fill for culvert bridge and replacement pipeline	N/A	0.02	N/A	N/A
	Seasonal Wetland	Fill for culvert bridge and replacement pipeline	N/A	0.01	N/A	0.01
	Newell Creek	Fill for culvert bridge and replacement pipeline	60	0.05	130	0.04
Temporary Barge Launch/Pier	Reservoir	Fill for construction pier	N/A	N/A	40	0.02
Total			**228**	**1.51**	**170**	**0.12**
Habitats accessible to salmonids (shaded gray)			**213**	**0.11**	**130**	**0.09**

As described above in the Proposed Federal Action, the City of Santa Cruz proposes to implement three mitigation projects, including the enhancement of 0.32 acres of riparian vegetation along Newell Creek below the dam (in addition to restoring areas disturbed during construction) and the replacement of existing in-channel wood structures downstream of the project site. The enhanced riparian vegetation and new wood structures will be designed to reduce erosion and to improve in-channel habitat complexity and storage of spawning gravels and in time are expected to improve upon the existing, baseline conditions in this reach of Newell Creek.

2.6 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject

to consultation (50 CFR 402.02 and 402.17(a)). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

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/operations in the watershed.

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

2.7 Integration and Synthesis

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

2.7.1 CCC Steelhead

The CCC steelhead DPS is listed as threatened. The action areas for the Newell Creek Access Road Bridge Rehabilitation Project (completed in October 2019) and the Newell Creek Dam Inlet/Outlet Replacement Project are located in the Newell Creek, a perennial tributary to the San Lorenzo River. NMFS identified the San Lorenzo River as a historically independent population for the CCC steelhead DPS as it is the largest population and watershed within the Santa Cruz Mountains Diversity Stratum (NMFS 2016). The CCC steelhead DPS has experienced severe declines due to the widespread degradation and loss of historic habitats caused by factors including hydrologic modifications (reservoir storage, surface diversions, and groundwater pumping), land use change (urbanization, timber harvest, agriculture, and mining), construction of dams and other migration impediments, channelization and disconnection from floodplains, and the introduction of non-native and invasive species. Each of the above factors has contributed to the decline of steelhead in the San Lorenzo River basin (NMFS 2016).

As described in Section 2.5 Effects of the Action, NMFS identified the following components of the project that may result in effects to CCC steelhead and/or habitat: fish collection and relocation, dewatering, temporary increases in suspended sediment and other construction-related contaminants, and impacts (temporary and permanent) to waters and wetlands. Of these,

fish collection and relocation, and dewatering have the potential to result in injury and mortality of juvenile CCC steelhead.

The Newell Creek Dam Inlet/Outlet Replacement Project will require dewatering of Newell Creek (400 feet or less) during two separate seasons, or years. This will include 350 feet in 2021 (or 2022) for the Newell Creek Dam Inlet/Outlet Replacement Project (150 and 200 feet for the spillway plunge pool and Newell Creek below the plunge pool, respectively), and approximately 400 feet in 2022 (or 2023) for Mitigation Project 3 downstream of the inlet/outlet project site (instream habitat enhancement). NMFS anticipates up to 170 juvenile steelhead may be present in the dewatered sections of Newell Creek at the Newell Creek Dam Inlet/Outlet Replacement Project and up to 160 juvenile steelhead may be present in the section of Newell Creek at the Mitigation Project 3 site.

Anticipated mortality from capture/relocation is expected to be approximately 2 percent of the fish relocated, and mortality from dewatering activities is expected to be approximately 3 percent of the fish in the area prior to relocation. Therefore, NMFS expects no more than 9 juvenile steelhead would be injured or killed as a result of the Newell Creek Dam Inlet/Outlet Replacement Project, and up to 9 juvenile steelhead during the implementation of Mitigation Project 3 in a subsequent year. Any CCC steelhead present would likely make up a very small proportion of the steelhead in the San Lorenzo River watershed. The relatively large number of juveniles produced by each spawning pair of adult steelhead in Newell Creek, the San Lorenzo River, and other nearby tributaries in future years is expected to produce enough juveniles to replace any juveniles that may be lost at the project sites due to relocation and dewatering. It is unlikely that the loss of up to 9 juvenile steelhead in a year resulting from these projects would impact future adult returns or the recovery potential of the CCC steelhead DPS.

The construction of the Newell Creek Access Road Rehabilitation Project in Newell Creek during September and October 2019 resulted in an exceedance of take. NMFS estimated no more than 20 fish would be present in the action area with no more than 2 fish mortalities. The observed abundance of juvenile steelhead (51 juvenile steelhead in 170 feet of stream) was more than double the expected number of fish in the action area, which is encouraging information and improves our understanding of the carrying capacity of this stretch of Newell Creek. Of the 51 fish observed, 48 were successfully relocated to habitats adjacent to the action area, however 3 died as a result capture and dewatering. Considering the observed juvenile steelhead abundance in upper Newell Creek was substantially higher than original considered, the slight exceedance of take (3 mortalities total) does not change NMFS' original conclusion that a small number of individuals lost as a result of project construction would not diminish the distribution, productivity, nor the recovery potential of the San Lorenzo River steelhead population or the CCC steelhead DPS.

We also consider the potential impacts of increased suspended sediment concentrations and other construction-related materials and the temporary and permanent loss of waters and wetland habitats. The implementation of avoidance and minimization measures is expected reduce the full magnitude of these effects. The replacement of failed log weir structures with new and improved wood structures downstream of Newell Creek Dam is expected to offset the minor loss of habitat related to the rock installation (bridge project) and the culvert bridge crossing

(inlet/outlet replacement project) by improving several hundred linear feet of instream habitat quality for future cohorts of steelhead in Newell Creek. Therefore, we do not expect the proposed project to affect the persistence or recovery of the San Lorenzo River population or the CCC steelhead DPS, and instead anticipate the quality of habitat in Newell Creek will improve which may lead to better spawning success and juvenile recruitment.

Climate change could affect CCC steelhead in the action areas. Although one anticipated outcome of future climate change is increases in water temperature brought on by increased summer air temperatures and reduced stream flow, NMFS anticipates these affects will be somewhat buffered by the constant release of cool waters from the bottom of Loch Lomond Reservoir. Given the marginal habitat quality present in and poor access to the action area, we do not expect conditions to worsen beyond those already occurring. Longer-term effects of climate change may exacerbate these conditions, however, by reducing the frequency and duration of flow events capable of facilitating adult steelhead passage into the action area. For short-term effects, climate change is not expected to significantly worsen existing conditions over the time frame considered in this biological opinion. Considering the above, we do not expect climate change to affect CCC steelhead in the action areas beyond the scope considered in this biological opinion.

2.7.2 Critical Habitat

Newell Creek downstream of Newell Creek Dam is critical habitat for the CCC steelhead DPS and CCC coho salmon ESU. In our adverse modification analysis, we consider the condition of critical habitat, the potential effects of the projects (completed and pending) on critical habitat, and whether or not those effects are expected to directly or indirectly diminish the value of critical habitat for the conservation of CCC steelhead or CCC coho salmon. We also consider the potential for climate change to alter conditions in the action areas such that critical habitat may be affected over the duration of time we consider for this consultation. These elements (condition of critical habitat across the DPS/ESU, in the watershed, and in the action areas; effects of the project on critical habitat, and effects of climate change on critical habitat) are considered further below.

Across the CCC steelhead DPS and CCC coho salmon ESU, critical habitat has been degraded by habitat alteration and development. While conditions vary throughout, critical habitat is generally impaired by habitat alteration and fragmentation, water diversions, groundwater extraction, invasive species, and estuarine habitat loss. These factors also affect CCC steelhead and CCC coho salmon critical habitat in the San Lorenzo River and Newell Creek, which have both been impaired by urban development, dam construction, and channel form degradation. Both watershed-wide factors and action area-specific factors affect critical habitat in the action areas leading to reduced habitat complexity and accessibility, poor substrate quality for spawning, and limited juvenile rearing habitat.

Effects to critical habitats from the proposed project is expected to include temporary impacts during project construction and permanent effects from minor loss of stream habitat. The temporary impacts are expected to be associated with disturbances to the river bed, banks, riparian corridor, and surface flow during dewatering and construction. As discussed above, these temporary impacts are not expected to adversely affect PBFs of CCC steelhead critical

habitat and essential features of CCC coho salmon critical habitat because aquatic habitat at the sites would be restored after the water diversion systems are removed. Furthermore, the habitats within the action areas are expected to be enhanced relative to their current condition through the inclusion of habitat complexity features (i.e., installation of large wood structures) and riparian vegetation restoration within 0.32 acres. Newell Creek within and between the action areas for both projects currently lacks complexity and in-channel wood features are rare. The improvements to existing wood structures downstream of Newell Creek Dam will not only minimize or offset the minor loss of rearing habitat space from construction but are expected to improve the value of the habitat in the upper reaches Newell Creek downstream of the dam. Given the small size of the impacted area and its relatively poor habitat quality, the small loss of habitat is not expected to adversely affect PBFs of CCC steelhead or the essential features of CCC coho salmon critical habitats.

Climate change could affect habitat conditions in the action areas in the relatively near term, potentially within the time frame we are considering for this consultation. Ongoing anthropogenic impairments common throughout the watershed (e.g. stream flow regulation and urban development), are also likely to persist within this and longer timeframes. However, we do not expect conditions to worsen beyond those currently occurring in the action areas and considered in this opinion. For example, extreme storms, higher average summer air temperatures, and lower total precipitation levels can already occur; potentially resulting in warmer stream temperatures and reduced stream flow in the summer. However, as described above, these potential effects are somewhat buffered by the release of cool waters from the bottom of Loch Lomond Reservoir. While short-term climate change effects could exacerbate these conditions, the effects of climate change are not expected to significantly worsen existing conditions over the time frame considered in this biological opinion. Considering the above, we do not expect climate change to alter conditions in the action areas beyond the scope considered in this opinion.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed Newell Creek Dam Inlet/Outlet Replacement Project and the exceedance of take resulting from the completed Newell Creek Access Road Bridge Rehabilitation Project are not likely to jeopardize the continued existence of CCC steelhead nor destroy or adversely modify designated critical habitat for the CCC steelhead DPS or the CCC coho salmon ESU.

2.9 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap,s capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity

conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur during construction of the Newell Creek Dam Inlet/Outlet Replacement Project. Take is expected to be limited to the juvenile (pre-smolt) life stage during fish capture/relocation and dewatering of approximately 350 and 400 feet of Newell Creek for the Newell Creek Dam Inlet/Outlet Replacement Project and for Mitigation Project 3, respectively.

As described in the above opinion, the amount of take expected within these areas has been increased based on additional, site-specific information. Table 4 shows the estimated amount of juvenile steelhead abundance and potential mortality from the associated project components. Take will be exceeded if values below are exceeded.

Table 4. Anticipated totals for juvenile steelhead abundance and mortality from fish capture and dewatering activities for the Newell Creek Dam Inlet/Outlet Replacement Project, per project/habitat component.

Dewatered Habitat	Anticipated Fish Abundance - Capture Relocation	Relocation Mortality (2 percent)	Dewatering Mortality (3 percent)	Total
Newell Creek	80			
Newell Creek plunge pool	90			
subtotal	170	4	5	9
Newell Creek - Mitigation Project 3	160	4	5	9

2.9.2 Effect of the Take

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

2.9.3 Reasonable and Prudent Measures

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

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

1. Undertake measures to ensure that injury and mortality to steelhead resulting from fish relocation and dewatering activities is low.
2. Undertake measures to minimize harm to steelhead from construction of the projects and

degradation of aquatic habitat.

3. Prepare and submit a report for each project to document the effects of construction and relocation activities.

2.9.4 Terms and Conditions

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

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

   a. The City of Santa Cruz will 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 the City of Santa Cruz will ensure that all biologists working on the projects are qualified to conduct fish collections in a manner which minimizes all potential risks to steelhead. Electrofishing, if used, will be performed by a qualified biologist and conducted according to the *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 will monitor the construction sites during placement and removal of cofferdams, and channel diversions to ensure that any adverse effects to salmonids are minimized. The biologists will be on site during all dewatering events to capture, handle, and safely relocate steelhead to a predetermined location, approved by NOAA Fisheries. The Corps, the City of Santa Cruz, or their retained biologist will notify NMFS biologist Joel Casagrande at (707) 575-6016 or via email at Joel.Casagrande@noaa.gov one week prior to capture activities in order to provide an opportunity for NMFS staff to observe the activities and approve the relocation sites.

   c. Steelhead will be handled with extreme care and kept in water to the maximum extent possible during rescue activities. All captured fish will be kept in cool, shaded, aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream, and fish will not be removed from this water except when released. To avoid predation, the biologists will 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 salmonids are found dead or injured, the biological monitor will contact NMFS biologist, Joel Casagrande at (707) 575-6016 or the NMFS North Central Coast Office (Santa Rosa, California) at 707-575-6050. The purpose of the contact is to review the activities resulting in take, determine if additional protective measures are required, and to ensure appropriate collection and transfer of salmonid mortalities and tissue samples. All salmonid mortalities will be retained. Tissue samples are to be acquired from each salmonid mortality per the methods identified in the NMFS Southwest Fisheries Science Center Genetic Repository protocols (contact the above NMFS staff for directions) and sent to: NOAA Coastal California Genetic Repository; Southwest Fisheries Science Center; 110 McAllister Way; Santa Cruz, California 95060.

e. An updated diversion and dewatering plan will be sent to the NMFS biologist identified above 30 days prior to the start of construction for review and approval.

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

a. The Corps or the City of Santa Cruz will 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. Trimming and removal of riparian vegetation will be limited to the minimum necessary to complete the work.

c. Fill material for cofferdams will be fully confined with the use of plastic sheeting, sandbags, or with other non-porous containment methods, such that sediment does not come in contact with stream flow or in direct contact with the natural streambed. All loose fill material for cofferdams or access ramps will be completely removed from the channel by October 15.

d. Any pumps used to divert live stream flow, outside the dewatered work areas, will 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. Treated wood may not be used in any temporary platforms or scaffolds in the creek channel. Lumber used for temporary construction operations must be unfinished and untreated wood. All materials used for temporary platforms or scaffolds must be completely removed from the channel no later than October 15.

f. In areas where concrete is used, a dry work area must be maintained to prevent conveyance of runoff from curing concrete to the surface waters of the adjacent stream at all times. Water that inadvertently contacts uncured concrete must not be discharged into surface waters.

g. Construction equipment used within the creek channels will 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, City of Santa Cruz or their contractors will contain the spill and remove the affected soils.

h. Once construction is completed, all project-introduced material (pipe, gravel, cofferdam, etc.) must be removed, leaving the river as it was before construction. Excess materials will be disposed of at an appropriate disposal site.

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

a. The Corps or the City of Santa Cruz must provide a written report to NMFS by January 15 of the year following construction of the project. The report must be submitted to NMFS North Central Coast Office, Attention: Joel Casagrande, 777 Sonoma Avenue, Room 325, Santa Rosa, California, 95404-6528. The report must contain, at a minimum, the following information:

i. Project Construction and Fish Relocation Report -- The report must include the following contents:

1. **Construction related activities --** The report(s) must include the dates construction began and was completed; a discussion of design compliance including: vegetation installation, and post-construction longitudinal profile and cross sections; a discussion of any unanticipated effects or unanticipated levels of effects on salmonids, including 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 salmonids killed or injured during the project action; and photographs taken before, during, and after the activity from photo reference points.

2. **Fish Relocation --** The report(s) 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. The report will also include information on non-native species that were removed.

ii. Post-Construction Vegetation and Wood Feature Monitoring and Reporting – The City of Santa Cruz must develop and submit for NMFS' review a plan to assess the success of revegetation of the site for each project as well as the success and integrity of the installed wood features. A draft of the monitoring plans must be submitted to NMFS (address specified in 3a above) for review and approval prior to the beginning of in-stream work season. Reports documenting post-project conditions of vegetation and wood structures installed at the site will be prepared and submitted annually for the first five years following completion of each project, unless the site is documented to be performing poorly, then monitoring requirements will be extended. Reports will document vegetation health and survivorship and percent cover, natural recruitment of native vegetation (if any), and any maintenance or replanting needs as well as the condition and status of the installed wood features. Photographs must be included. If poor establishment (vegetation) or stability/performance (wood structures) is documented, the report must include recommendations to address the source of the performance problems.

2.10 Conservation Recommendations

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

NMFS has the following conservation recommendation.

As summarized in the Environmental Baseline above, the Newell Creek channel downstream of Newell Creek Dam continues to incise due to the disruption of sediment delivery from the majority of the watershed by Newell Creek Dam. In addition to channel incision, this disruption has resulted in a paucity of suitable spawning gravels in the upper and middle reaches of Newell Creek downstream of Newell Creek dam. The continued channel incision in the lower portion of the creek has likely contributed poor access to the full 1.7 miles of creek below Newell Creek Dam (Holley 2010). To improve spawning habitat (gravel availability) throughout the 1.7 miles of Newell Creek, NMFS recommends the City of Santa Cruz investigate the feasibility of a gravel augmentation program for the reach of Newell Creek below Newell Creek Dam and if determined to be feasible, develop and implement an appropriate gravel augmentation program.

2.11 Reinitiation of Consultation

This concludes formal consultation for the Reinitiation of the Newell Creek Access Road Bridge Rehabilitation Project and the Newell Creek Dam Inlet/Outlet Replacement Project.

As 50 CFR 402.16 states, reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of

incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

2.12 "Not Likely to Adversely Affect"' Determinations

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is not likely to adversely affect listed species or critical habitat is that all of the effects of the action are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.

NMFS evaluated the proposed actions for potential adverse effects to the endangered CCC coho salmon ESU. NMFS considered the life history of coho salmon (Shapovalov and Taft 1954; Hassler 1987), the project's biological assessments (Dudek 2018; 2019), recent fisheries monitoring information, and current habitat conditions.

The life history of coho salmon in California has been well documented by Shapovalov and Taft (1954) and Hassler (1987). Coho salmon are semelparous, *i.e.*, they die after spawning. In contrast to the life history patterns of other anadromous salmonids, coho salmon in California generally exhibit a relatively simple 3-year life cycle generally consisting of one year in freshwater as juveniles (Shapovalov and Taft 1954). Adult salmon typically begin the freshwater migration from the ocean to the freshwater environment in late fall with peak escapement in January and February but continue into March, with spawning occurring shortly after arrival to the spawning ground (Shapovalov and Taft 1954). Upon emergence from the redd, coho salmon fry seek out shallow water, usually along stream margins. As they grow, juvenile coho salmon often occupy habitat at the heads of pools, which generally provide an optimum mix of high food availability and good cover with low swimming cost (Nielsen 1992).

Coho salmon are typically associated with small to moderately-sized coastal streams characterized by heavily forested watersheds; perennially-flowing reaches of cool, high-quality water; dense riparian canopy; deep pools with abundant overhead cover; instream cover consisting of large, stable woody debris and undercut banks; and gravel or cobble substrates (Sandercock 1991). Juvenile coho salmon feed primarily on drifting aquatic and terrestrial insects, much of which are produced in the riparian canopy, and on aquatic invertebrates growing within the interstices of the substrate and in leaf litter in pools and side channels. Juvenile coho salmon are more strongly associated with well-shaded, deep pools with dense overhead cover; abundant submerged cover composed of undercut banks, logs, roots, and other woody debris; and water temperatures of 12-15 °C, but not exceeding 22-25 °C for extended time periods (Brett 1952; Bell 1973; Reiser and Bjornn 1979). Survival of young coho salmon drops sharply when fine sediment makes up 15 percent or more of the substrate (Quinn 2005).

Like most populations in California, coho salmon in the San Lorenzo River have experienced a marked decline over the past century (NMFS 2012; Williams et al. 2016). There is little evidence that coho salmon have reproduced successfully in the San Lorenzo River watershed over the last 30 years. Although adults have been occasionally captured or detected at the Felton Diversion Dam (i.e., returns of PIT-tagged released coho salmon from the Southern Coho Salmon Captive Broodstock Program in nearby Scott Creek) during the winter spawning season, juvenile coho salmon have not been observed in the watershed since 2005. Prior to this observation, the last credible report of successful coho salmon reproduction in the watershed occurred in 1981.

As described above in the Environmental Baseline, a natural bedrock chute is located approximately 0.5 and 0.7 miles downstream of the action areas of the proposed actions. The bedrock chute has been determined to be passable only under very limited stream flow conditions. NMFS and others have determined this bedrock feature is the likely impassable to coho salmon adults. Thus, coho salmon are not likely to be present in this reach of Newell Creek during the construction season. Due to the distance from the impediment, the minimization measures proposed, coho salmon are extremely unlikely to be exposed to temporary changes in stream flow from dewatering activities, or degraded water quality conditions during construction. Therefore, the effects of construction activities from either of the proposed actions are expected to be discountable.

Construction of both projects will require temporary dewatering of portions of Newell Creek and the plunge pool below Newell Creek dam. In addition, construction may result in temporary increases in sediment delivered to creek as well as minor vegetation removal associated with access to the creek channel. Although both action areas are within designated critical habitat for CCC coho salmon and temporary adverse impacts to habitats are likely to occur during construction, these areas are not likely to be accessible to coho salmon and the proposed minimization measures for both projects are expected to avoid any long-term adverse impacts to critical habitat.

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

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the Corps and descriptions of EFH for Pacific Coast Salmon (PFMC 2014) contained in the fishery management plan developed by the PFMC and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

Effects of the proposed action will impact EFH for Pacific Coast Salmon (PFMC 2014). The Project action area is located in freshwater spawning, rearing, and migratory Habitat Areas of Particular Concern (HAPCs) for coho salmon managed within the Pacific Coast Salmon FMP.

3.2 Adverse Effects on Essential Fish Habitat

Adverse effects to EFH will include potential increases in turbidity of the water column and sedimentation in the channel from the installation and removal of dewatering facilities and subsequent rewetting of the channel, and both temporary and permanent loss of rearing habitat during channel dewatering and placement of permanent fill for both projects. These effects on habitat are more fully described in the preceding biological opinion.

3.3 Essential Fish Habitat Conservation Recommendations

There are no practical EFH Conservation Recommendations to provide because impacts to EFH are expected to minor, temporary, localized, or addressed through avoidance and minimization measures.

3.4 Supplemental Consultation

The Corps must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that effects the basis for NMFS' EFH Conservation Recommendations (50 CFR600.920(1)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the Corps. Other interested users could include City of Santa Cruz, California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and Central Coast Regional Water Quality Control Board. Individual copies of this opinion were provided to the Corps. The format and naming adheres to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security

of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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