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

July 5, 2012

In response refer to:
2012/02648

Lieutenant Colonel John K. Baker
District Engineer
Department of the Army
San Francisco District
U.S. Army Corps of Engineers
1455 Market Street
San Francisco, California 94103-1398

Dear Colonel Baker:

Thank you for your letter of July 2, 2012, requesting initiation of formal consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*), for the proposed replacement of a retaining wall and construction of a fishway in Arroyo Corte Madera del Presidio at the Redwood Lodge in Mill Valley, Marin County, California (Corps file #2012-00159N). The United States Army Corps of Engineers (Corps) proposes to authorize Mr. Peter Buckley to construct this project pursuant to Section 404 of the Clean Water Act (33 U.S.C. § 1344).

The enclosed biological opinion is based on our review of Mr. Buckley's proposal and describes NMFS' analysis of potential effects on threatened Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) and designated critical habitat for CCC steelhead and CCC coho salmon (*O. kisutch*) in accordance with section 7 of the ESA. Threatened CCC steelhead are present within the project's action area and Arroyo Corte Madera del Presidio is designated critical habitat for this species and CCC coho salmon. In the enclosed biological opinion, NMFS concludes the project is not likely to jeopardize the continued existence of threatened CCC steelhead. NMFS has also concluded the proposed project is not 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 project construction. CCC steelhead are likely to be present during dewatering of the work site for construction. An incidental take statement which applies to this project with non-discretionary terms and conditions is included with the enclosed biological opinion.

Please contact Gary Stern at 707-575-6060 or Gary.Stern@noaa.gov if you have any questions concerning this section 7 consultation, or if you require additional information.

Sincerely,

for Rodney R. McInnis
Regional Administrator

Enclosure

cc: Chris Yates, NMFS, Long Beach, CA
Sahrye Cohen, Corps Regulatory Division, San Francisco, CA
Tim Dodson, CDFG, Yountville, CA
Al Cornwall, CSW/Stuber-Stroeh Engineering Group, Inc., Novato, CA
Copy to file ARN #151422SWR2012SR00295

Enclosure

BIOLOGICAL OPINION

ACTION AGENCY:	U.S. Army Corps of Engineers, San Francisco Federal Emergency Management Agency, Oakland
ACTION:	Redwood Lodge Retaining Wall and Fishway on Arroyo Corte Madera del Presidio, Mill Valley, California.
CONSULTATION CONDUCTED BY:	National Marine Fisheries Service, Southwest Region
TRACKING NUMBER:	2012/02648
DATE ISSUED:	July 5, 2012

I. CONSULTATION HISTORY

By email dated March 27, 2012, the U.S. Army Corps of Engineers (Corps) notified NOAA's National Marine Fisheries Service (NMFS) of a request by Mr. Peter Buckley to perform emergency repairs to a failed retaining wall in Arroyo Corte Madera del Presidio (hereinafter referred to as "Arroyo Corte Madera"). The failed wall resulted in the undermining of a corner of the Redwood Lodge, a historic building, at 160 Corte Madera Way in Mill Valley, California.

Representatives from NMFS, the Corps, and the applicant's consultant, CSW/Stuber-Stroeh Engineering Group, Inc. (CWS/Stuber-Stroeh), conducted a site visit to the project site at the Redwood Lodge on April 4, 2012. The failed wall had resulted in structural damage to the building's foundation and the group agreed that repairs are urgently needed. The group also observed a 4.5-foot high concrete dam spanning the channel of Arroyo Corte Madera at the upstream end of the failed retaining wall. The dam's concrete apron had also failed along the retaining wall. The combination of the dam and apron creates a significant impediment to the upstream passage of anadromous fish. At the request of NMFS, the applicant agreed to construct a fishway adjacent to the retaining wall for the purpose of improving upstream fish passage. CSW/Stuber-Stroeh was tasked by the applicant to prepare a fishway design for the site.

To address the most urgent problem at the Redwood Lodge, the applicant performed work on the building's foundation during April and May 2012. This work occurred landward of the retaining wall and was outside of the stream channel. The applicant agreed to postpone work on the retaining wall and in the stream channel until June.

During May and June 2012, representatives from NMFS, the Corps, and the California Department of Fish and Game (CDFG) worked with CSW/Stuber-Stroeh to develop a fishway design that provided upstream passage for adult steelhead and remained within the applicant's budget.

Additional site visits by NMFS and CSW/Stuber-Stroeh were conducted on May 24 and June 8, 2012, to assess conditions and develop the fishway design. A three step pool fishway design was submitted to NMFS, the Corps and CDFG by CSW/Stuber-Stroeh on June 14, 2012, and a conference call between NMFS, the Corps, CDFG, and CSW/Stuber-Stroeh was held on June 15, 2012. Revised fishway design plans were submitted on June 20, 2012 and another conference call held on June 21, 2012. Agreement was reached on the fishway design during the June 21, 2012, conference call and final design plans were provided to NMFS, the Corps and CDFG on June 22, 2012.

By letter dated July 2, 2012, the Corps requested initiation of formal consultation with NMFS pursuant to section 7 of the Federal Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531, *et seq.*), regarding the proposed replacement of the failed retaining wall and construction of a fishway on Arroyo Corte Madera at the Redwood Lodge in Mill Valley, California (Corps File No. 2012-00159N). The Corps determined the proposed project may adversely affect threatened Central California Coast (CCC) steelhead and designated critical habitat due to dewatering and relocating fish in the creek for construction purposes.

II. DESCRIPTION OF PROPOSED ACTION

The Corps proposes to issue a permit under Section 404 of the Clean Water Act to Mr. Peter Buckley to replace a failed concrete retaining wall with a new concrete retaining wall on the bank of Arroyo Corte Madera. The retaining wall was damaged during high stream flow events in March 2012. The wall supports both the creek bank and the foundation of an historic building, the Redwood Lodge, at 160 Corte Madera Way in Mill Valley, California. The project also includes construction of a fishway adjacent to the new retaining wall to facilitate upstream salmonid passage over a 4.5-foot high concrete dam which spans the channel at the upstream end of the retaining wall. The project will occur this summer, prior to October 15. NMFS does not anticipate any interrelated or interdependent actions associated with the proposed action.

A. Description of Proposed Work

1. Retaining Wall and Fishway Design and Construction

The replacement retaining wall will be constructed within the footprint of the existing wall on the south bank of Arroyo Corte Madera. The overall length of the constructed wall will be approximately 48 linear feet and the wall height is approximately 8 feet. The new retaining wall structure will contain approximately 17 cubic yards of concrete and 5 cubic yards of rock. The

fishway will be constructed adjacent to the retaining wall and span the full width of the channel. The fishway will extend approximately 37 feet down the channel of Arroyo Corte Madera and contain approximately 30 cubic yards of concrete and rock materials.

At the upstream end of the retaining wall, an existing concrete dam spans the width of the Arroyo Corte Madera channel. Extending downstream from the 4.5-foot high dam and adjacent to the failed retaining wall, a concrete apron slopes down the channel creating a ramp-like structure between the creek bottom and the crest of the dam. The project proposes to remove this concrete apron and place the new fishway within its footprint. The fishway will have three step pools allowing fish to gradually ascend the 4.5 feet rise over the existing concrete dam. For the creation of the three step pools, three concrete weirs will be constructed across the channel. The length of each step pool will be approximately 12 feet and the water surface elevation between pools is approximately 12 inches. Rock and geotextile fabric will be installed to seal the bottom of the pools. The existing concrete dam at the upstream end of the fishway will be modified to direct stream flow and improve fish passage by cutting a notch in the dam's crest, approximately 1 foot deep and 2 feet wide.

Construction work will require a track-mounted drilling machine, concrete pumps, and trucks to haul materials to the site. A temporary work pad will be located adjacent to the creek in an area that is predominately vegetated with invasive, non-native bamboo. Adjacent large redwood trees will not be removed. All fueling and maintenance of equipment will be done away from the creek in an area with secondary containment to guard against potential spills. All construction debris will be removed from the site for disposal in an appropriate upland landfill site. Existing concrete rubble in the channel will also be removed and disposed in an appropriate landfill. Construction is scheduled to occur over a 6-10 week period in July, August, and September 2012. All work will be completed and equipment removed from the channel no later than October 15, 2012.

2. Dewatering and Fish Relocation

To facilitate construction, a portion of Arroyo Corte Madera will be dewatered at the project site. The dewatered section will begin at the top of the existing concrete dam which spans the channel and extend approximately 50 feet downstream. In order to reduce impacts on steelhead from dewatering and construction activities, the project proposes to capture and relocate fish from the 50-foot long reach subject to dewatering. The applicant's biological consultant has prepared a Fish Collection and Relocation Plan (Rich and Associates 2012) for the proposed project.

Block nets will be installed upstream and downstream of the area to be dewatered to prevent fish from moving into and out of the project area. The nets will remain in place during all fish relocation activities and while the stream is dewatered. Prior to dewatering, qualified fisheries biologists will relocate fish using both hand-held nets and electrofishers. Collected fish will be relocated to a suitable location in Arroyo Corte Madera upstream or downstream of the work site.

Temporary cofferdams will be installed at the upstream and downstream limits of the dewatered area. The upstream cofferdam will collect the stream flow of Arroyo Corte Madera and divert it into a pipeline to bypass the construction area. Cofferdams will be constructed with sand bags, gravel bags, or an inflatable bag may be used. Cofferdams will not contain erodible material such as soil or fine sediment. Cofferdams will be installed and removed by hand. If pumps are used to assist with dewatering the work site, a fish screen with 1/8 inch mesh will be installed over the intake to prevent entrainment. Fish collection will continue during dewatering to ensure all fish are relocated prior to the site becoming fully dry.

B. Action Area

The proposed project is located in the Town of Mill Valley, Marin County, California, along Arroyo Corte Madera. The action area extends along 150 linear feet of Arroyo Corte Madera and includes the stream's bed and banks. The area of direct impact due to stream diversion, fish capture and relocation, and construction activities is approximately 50 feet. No riparian trees will be disturbed. Indirect effects to water quality from turbidity and sedimentation arising from project construction are expected to extend an additional 100 feet downstream of the dewatered reach. These water quality effects are expected to be limited to approximately 100 linear feet due to summer time low flow conditions. Fish relocation sites will also occur in areas immediately adjacent to the 50-foot long construction area. Laterally, the action area encompasses the left and right banks, the creek channel, and the associated floodplain and riparian corridor.

III. ANALYTICAL FRAMEWORK

A. Jeopardy Analysis

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

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

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

B. Adverse Modification Analysis

This biological opinion does not rely on the regulatory definition of destruction or adverse modification of critical habitat at 50 CFR §402.02, which was invalidated by the 9th Circuit Court of Appeals in 2004. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

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

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

C. Use of Best Available Scientific and Commercial Information

To conduct the assessment, NMFS examined an extensive amount of information from a variety of sources. Detailed background information on the biology and status of the listed species and

critical habitat has been published in a number of documents including peer reviewed scientific journals, primary reference materials, and governmental and non-governmental reports. Additional information regarding the effects of the project's actions on the listed species in question, their anticipated response to these actions, and the environmental consequences of the actions as a whole was formulated from the aforementioned resources, and the following:

1) *Application for Department of Army Permit.* Signed by Al Cornwall, CSW/Stuber-Stroeh. March 23, 2012.

2) "Redwood Lodge Conceptual Fish Passage" engineering drawings. Prepared by CSW/Stuber-Stroeh Engineering Group, Inc. June 2012.

3) *Fish Collection and Relocation Plan.* Prepared for Peter Buckley. Prepared by A.A. Rich and Associates. June 2012.

4) *Notification of Lake or Streambed Alteration.* Prepared by CSW/Stuber-Stroeh Engineering Group, Inc. for the California Department of Fish and Game. June 2012.

Information was also provided in emails messages, site visits, meetings, and telephone conversations between April and June 2012. For information that has been taken directly from published, citable documents, those citations have been referenced in the text and listed at the end of this document. A complete administrative record of this consultation is on file at the NMFS North Central Coast Office (Administrative Record Number 151422SWR2012SR00295).

IV. STATUS OF THE SPECIES AND CRITICAL HABITAT

This biological opinion analyzes the effects of the Redwood Lodge retaining wall and fishway project on the CCC steelhead DPS and designated critical habitat for this species. CCC steelhead are listed as threatened under the ESA (71 FR 834). The CCC steelhead DPS includes steelhead in coastal California streams from the Russian River to Aptos Creek, and the drainages of Suisun Bay, San Pablo Bay, and San Francisco Bay. CCC steelhead occur in Arroyo Corte Madera and are expected to be present at the project site during construction. Arroyo Corte Madera, including the project area, is designated as critical habitat for CCC steelhead (70 FR 52488).

Historically, the Arroyo Corte Madera watershed supported coho salmon (*Oncorhynchus kisutch*). Recorded observations of coho within the watershed date from 1946 to 1981 (Leidy *et al.* 2005a). The last sighting of coho occurred in September 1981 at a small, well-shaded pool on lower Arroyo Corte Madera (Leidy *et al.* 2005a). Based on this information, NMFS considers endangered CCC coho extirpated from Arroyo Corte Madera watershed. However, Arroyo Corte Madera is designated critical habitat for endangered CCC coho salmon (64 FR 24049).

A. Species Description and Life History

Steelhead are anadromous forms of *O. mykiss*, spending some time in both fresh- and saltwater. The older juvenile and adult life stages occur 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). Although one-time spawners are the great majority, Shapolov 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 young juveniles all rear in freshwater until they become large enough to migrate to the ocean to finish rearing and maturing to adults.

General reviews for steelhead in California document much variation in life history (Barnhart 1986; Busby *et al.* 1996; McEwan 2001; Shapovalov and Taft 1954). Although variation occurs, in coastal California juvenile steelhead usually live in freshwater for 1 to 2 years before emigrating to the ocean. Juvenile steelhead emigration from their natal streams occurs episodically during winter and spring months, and generally occurs during high flow events. Barnhart (1986) reported that peak smolt migration occurs in March and April, and steelhead smolts in California typically range in size from 140 to 210 millimeter (mm) (fork length). Once they leave their natal streams, steelhead will spend 1 to 3 years in the ocean before returning to spawn.

Adult winter-run steelhead typically migrate from the ocean to freshwater between December and April, peaking in January and February (Fukushima and Lesh 1998). Steelhead females build redds to bury eggs for a several month-long incubation period. Redds are generally located in areas where the hydraulic conditions are such that fine sediments, for the most part, are sorted out and streamflow is constant. This is because, during the incubation period, the intragravel environment must permit a constant flow of water to deliver dissolved oxygen and to remove metabolic wastes. Other intragravel parameters such as the gravel permeability, water temperature, substrate composition, and organic material in the substrate effect the survival of eggs to fry emergence (Chapman 1988; Everest *et al.* 1987; Shapovalov and Taft 1954). Adult steelhead may spawn 1 to 4 times over their life span.

Steelhead fry rear in edgewater habitats of streams and move gradually into pools and riffles as they grow larger. Cover, water temperature, sediment, and food items 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 Jr. 2005). Optimal temperatures for steelhead growth range between 10 and 20 degrees (°) Celsius (C) (Hokanson *et al.* 1977; Myrick

and Cech Jr. 2005; Wurtsbaugh and Davis 1977). Fluctuating diurnal water temperatures are also important for the survival and growth of salmonids (Busby *et al.* 1996).

Turbidity (*i.e.*, water clarity) also can influence the behavior, distribution and growth of juvenile salmonids (Cordone and Kelley 1961; Newcombe and McDonald 1991; Redding *et al.* 1987; Newcombe and Jensen 1996; Sigler *et al.* 1984). The impacts of turbidity on juvenile salmonids are largely linked to factors such as background turbidity levels and the duration of turbid conditions. Bisson and Bilby (1982) found that juvenile coho salmon that were acclimated to clear water did not exhibit significant sediment avoidance until the turbidity reached 70 nephlometric turbidity units (NTUs). Sigler *et al.* (1984) observed avoidance of turbid water by juvenile steelhead and coho when exposed to turbidities as low as 38 NTUs and 22 NTUs, respectively, for a period of 15-17 days. Sigler *et al.* (1984) also observed that fish kept in these turbid conditions had lower growth rates than fish kept in clear water for the same amount of time.

B. Species and Critical Habitat Status

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

We use these population viability parameters as surrogates for numbers, reproduction, and distribution, the criteria found within the regulatory definition of jeopardy (50 CFR §402.02). For example, the first three parameters are used as surrogates for numbers, reproduction, and distribution. We relate the fourth parameter, diversity, to all three regulatory criteria. Numbers, reproduction, and distribution are all affected when genetic or life history variability is lost or constrained resulting in reduced population resilience to environmental variation at local or landscape-level scales.

1. CCC Steelhead

Historically, approximately 70 populations[1] 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

[1] Population as defined by Bjorkstedt *et al.* 2005 and McElhaney *et al.* 2000 as, in brief summary, a group of fish of the same species that spawns in a particular locality at a particular season and does not interbreed substantially with fish from any other group. Such fish groups may include more than one stream. These authors use this definition as a starting point from which they define four types of populations (not all of which are mentioned here).

dependent upon immigration from nearby CCC steelhead DPS populations to ensure their viability (Bjorkstedt *et al.* 2005; McElhany *et al.* 2000).

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 Vincente, Soquel, and Aptos 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 fragmentation of habitat has likely also led to loss of genetic diversity in these populations. For more detailed information on trends in CCC steelhead abundance, see: NMFS 1997; Busby *et al.* 1996; Good *et al.* 2005; Spence *et al.* 2008; Williams *et al.* 2011.

CCC steelhead have experienced serious declines in abundance and long-term population trends suggest a negative growth rate. This indicates the DPS may not be viable in the long term. DPS 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 is likely to slow their decline relative to other salmonid DPSs or ESUs in worse condition. In 2005, a 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).

A more recent viability assessment of CCC steelhead concluded that populations in watersheds that drain to San Francisco Bay are highly unlikely to be viable, and that the limited information available did not indicate that any other CCC steelhead populations could be demonstrated to be viable[2] (Spence *et al.* 2008). Research monitoring data from 2008/09 and 2009/10 of adult CCC steelhead returns shows a decline in adults across the range of the DPS compared to the last ten years (Jeffrey Jahn, personal communication, 2010). The most recent status update found that the status of the CCC steelhead DPS remains "likely to become endangered in the foreseeable future" (Williams *et al.* 2011), as new and additional information available since Good *et al.* (2005), does not appear to suggest a change in extinction risk. On December 7, 2011, NMFS chose to maintain the threatened status of the CCC steelhead (76 FR 76386).

[2] Viable populations have a high probability of long-term persistence (> 100 years).

2. CCC Steelhead Critical Habitat

The condition of CCC steelhead critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that present depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat[3]: logging, agricultural and mining activities, urbanization, stream channelization, dams, wetland loss, and water withdrawals, including unscreened diversions for irrigation. Impacts of concern include alteration of stream bank and channel morphology, alteration of water temperatures, loss of spawning and rearing habitat, fragmentation of habitat, loss of downstream recruitment of spawning gravels, loss of large woody debris, degradation of water quality, removal of riparian vegetation resulting in increased stream bank erosion, increases in erosion and sedimentation in streams from upland areas, loss of shade (higher water temperatures) and loss of nutrient inputs (Busby *et al.* 1996; 70 FR 52488). Water development has drastically altered natural hydrologic cycles in many of the streams in the DPS. Alteration of flows results in migration delays, loss of suitable habitat due to dewatering and blockage; stranding of fish from rapid flow fluctuations; entrainment of juveniles into poorly screened or unscreened diversions, and increased water temperatures harmful to salmonids. Overall, the current condition of CCC steelhead critical habitat is degraded, and does not provide the full extent of conservation value necessary for the recovery of the species.

3. CCC Coho Salmon Critical Habitat

The condition of CCC coho salmon critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that present depressed population conditions are, in part, the result of the following human induced factors affecting critical habitat: logging, agricultural and mining activities, urbanization, stream channelization, dams, wetland loss, and water withdrawals and unscreened diversions for irrigation.

Numerous studies have demonstrated that land use activities associated with logging, road construction, urban development, mining, agriculture, and recreation, have significantly degraded coho salmon critical habitat quantity and quality in the CCC coho salmon ESU. Migration, spawning, and rearing PCEs have been degraded or lost. Impacts of concern include alteration of stream bank and channel morphology, alteration of water temperatures, loss of spawning and rearing habitat, fragmentation of habitat, loss of downstream recruitment of spawning gravels and large woody debris, degradation of water quality, removal of riparian vegetation resulting in increased stream bank erosion and higher water temperatures, increases in erosion entry to streams from upland areas, loss of shade (higher water temperatures), and loss of nutrient inputs (61 FR 56138).

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

Depletion and storage of natural river and streamflows have drastically altered natural hydrologic cycles in many of the streams in the ESU. Alteration of flows results in migration delays, loss of suitable habitat due to dewatering and blockage, stranding of fish from rapid flow fluctuations, entrainment of juveniles into poorly screened or unscreened diversions, and increased water temperatures harmful to salmonids (61 FR 56138). Overall, current condition of CCC coho salmon critical habitat is degraded, and does not provide the full extent of conservation value necessary for the recovery of the species.

C. Global Climate Change

Global climate change presents an additional potential threat to CCC steelhead and designated critical habitat for CCC steelhead and CCC coho salmon. Modeling of climate change impacts in California suggests that average summer air temperatures are expected to increase (Lindley *et al.* 2007). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe *et al.* 2004). Total precipitation in California may decline; critically dry years may increase (Lindley *et al.* 2007; Schneider 2007). The Sierra Nevada snow pack may decrease by as much as 70 to 90 percent by the end of this century under the highest emission scenarios modeled (Luers *et al.* 2006). Wildfires are expected to increase in frequency and magnitude, by as much as 55 percent under the medium emissions scenarios modeled (Luers *et al.* 2006). Vegetative cover may also change, with decreases in evergreen conifer forest and increases in grasslands and mixed evergreen forests. The likely change in amount of rainfall in Northern and Central Coastal California streams under various warming scenarios is less certain, although as noted above, total rainfall across the state is expected to decline.

For the California North Coast, some models show large increases (75 to 200 percent) in rainfall amounts while other models show decreases of 15 percent to 30 percent (Hayhoe *et al.* 2004). It has been estimated that snowmelt contribution to runoff in the San Francisco Bay and San Joaquin Delta may decrease by about 20 percent per decade over the next century (Cloern *et al.* 2011). Many of these changes are likely to further degrade CCC steelhead and CCC coho salmon freshwater habitat by, for example, reducing stream flows during the summer and raising summer water temperatures. Estuaries may also experience changes detrimental to salmonids. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia *et al.* 2002). Cloern *et al.* (2011) estimates that the salinity in San Francisco Bay could increase by 0.30-0.45 practical salinity unit (psu) per decade due to the confounding effects of decreasing freshwater inflow and sea level rise. 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). 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).

V. ENVIRONMENTAL BASELINE

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

A. Action Area Overview

The Arroyo Corte Madera watershed drains the east side of Mount Tamalpais and flows eastward to Richardson Bay, an arm of San Francisco Bay. The watershed is approximately eight square miles and includes urbanized areas in the City of Mill Valley and the unincorporated community of Homestead Valley. Tributaries to Arroyo Corte Madera include Old Mill Creek, Reed Creek (flows through Homestead Valley), Widow Reed Creek (flows down East Blithedale Canyon), and Warner Creek. Portions of the creek are underground through downtown Mill Valley (Rich and Associates 1995).

The climate is Mediterranean, with over 90 percent of annual precipitation occurring between November and April. Cool, moist coastal fog generally alternates with clear, warm weather during the months of May through September, and significant rainfall during that time is rare. Flows within the watershed are highly variable and can go quickly from low base flow conditions to high flows and then quickly recede again. The estimated 2-year flow event is approximately 300 cubic feet per second (cfs) at the project site and the 10-year flow event is about 450 cfs. During the dry season, flows in Arroyo Corte Madera are typically 1 cfs or less with intermittent dry areas in late summer and early fall.

B. Status of CCC Steelhead and Critical Habitat in Action Area

Steelhead within Arroyo Corte Madera are part of the CCC steelhead DPS and Arroyo Corte Madera is historically a dependent population (Spence *et al.* 2008; Spence *et al.* 2012). Fish surveys performed between 1946 and 2010 (Rich and Associates 1995; Leidy *et al.* 2005b; Rodoni 2012) document the historic and continued presence of steelhead within the Arroyo Corte Madera watershed. Rich and Associates (1995) report juvenile steelhead densities ranging from 0 to 0.07 fish per square foot. In July 1997, sampling by Leidy at four locations in Arroyo Corte Madera yielded density estimates ranging from 2 to 25 juvenile steelhead per 100 feet of creek (Leidy *et al.* 2005b). Snorkel surveys conducted by Rodoni (2010) yielded juvenile steelhead densities in the watershed ranging from 0 to 0.04 fish per square foot.

PCEs of designated critical habitat for CCC steelhead and CCC coho salmon in the project area include sites for migration and rearing. Essential features of designated critical habitat for listed

salmonids in freshwater consist of 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 24049 and 70 FR 5288).

Within the action area of this project, PCEs are generally poor to fair for migration and rearing. The concrete lined channel bottom precludes spawning. Concrete and rock walls line both banks of the creek for the entire length of the action area. At the upstream end of the action area, a concrete dam rises 4.5 feet above the bed of the channel. Immediately below the dam, a concrete ramp was constructed to the dam crest. This apron spans the entire channel width and extends approximately 25 feet downstream. Adjacent to the failed retaining wall, the concrete ramp has broken and the rubble foundation is partially exposed. Concrete and rock wall remnants from failed retaining wall and broken concrete apron litter the channel.

Downstream of the action area, habitat conditions in Arroyo Corte Madera improve considerably. Rich and Associates (1995) report the Miller Park area (approximately 1,000 feet downstream) contains pools associated with overhanging boulders, bedrock, and bankcut, and there appear to be abundant food (*i.e.*, terrestrial insects) for rearing salmonids. Upstream of the action area, Rich and Associates (1995) characterized the Blithedale Park reach as good habitat for steelhead with cascades, bedrock pools and clean water. NMFS estimates there is 1 to 2 miles of good habitat in Arroyo Corte Madera for steelhead spawning and rearing above the action area.

C. Factors Affecting the Species Environment in the Action Area

Intensive residential development along the creek over the past 100 years has led to the current state of Arroyo Corte Madera in the project area. The 150-foot long action area is bordered by houses and backyards on both creek banks. The channel and banks have been lined with rock walls and concrete for decades. The concrete banks are near vertical and do not support vegetation. At the upstream end of the action area, a 4.5-foot tall concrete dam was once used to create a pool for swimming. Wooden flashboards were installed on the crest of the concrete dam to back-up water and create water depth. The flashboards are no longer used, but the 4.5-foot tall concrete dam remains across the entire channel. The concrete dam in combination with its broken concrete apron creates a significant upstream passage impediment[4] for juvenile steelhead under all flow conditions, and for adult steelhead under low and moderate flow conditions.

Although some small pockets of gravel and fines have collected along irregularities in the concrete channel bottom, in-steam cover is generally lacking due to the concrete-lined channel. The lack of instream cover and poor habitat complexity present marginal conditions for juvenile salmonid rearing. Riparian vegetation is well-developed at the top of banks and consists primarily of native plant species, including redwoods, bays, and fern understory. The creek

[4] Large juveniles may be able to move upstream under some high flow conditions, but this is uncertain.

channel in action area is well shaded by the riparian canopy and redwood trees. Water temperatures are generally cool ranging between 15 and 18 °C during the summer.

C. Previous Section 7 Consultations and Section 10 Permits in the Action Area

No formal or informal consultations pursuant to section 7 of the ESA have been previously conducted by NMFS within the action area.

NMFS' Section 10(a)(1)(A) research and enhancement permits and section 4(d) limits or exceptions could potentially occur within this project's action area on Arroyo Corte Madera. Salmonid monitoring approved under these programs includes carcass surveys, smolt outmigration trapping, and juvenile density surveys. In general, these activities are closely monitored and require measures to minimize take during the research activities.

VI. EFFECTS OF THE ACTION

The purpose of this section is to identify the direct and indirect effects of the proposed action, and any interrelated or interdependent activities, on threatened CCC steelhead, CCC steelhead critical habitat, and CCC coho salmon critical habitat. Our approach was based on knowledge and review of the ecological literature and other relevant materials. We used this information to gauge the likely effects of the proposed project via an exposure and response framework that focuses on what stressors (physical, chemical, or biotic), directly or indirectly caused by the proposed action, that salmonids are likely to be exposed to. Next, we evaluate the likely response of salmonids to these stressors in terms of changes to salmonids survival, growth, and reproduction, and changes to the ability of PCEs to support the value of critical habitat in the action area. PCEs include sites essential to support one or more life stages of the species. These sites for migration, spawning, and rearing in turn contain physical and biological features that are essential to the conservation of the species. Where data to quantitatively determine the effects of the proposed action on CCC steelhead, their critical habitat, and CCC coho salmon critical habitat were limited or not available, our assessment of effects focused mostly on qualitative identification of likely stressors and responses.

Construction activities associated with the project are expected to affect steelhead through fish relocation, dewatering of stream reaches, and temporary increased sediment mobilization. Construction is scheduled to occur during July, August, and September 2012. Only juvenile steelhead are expected to be in the action area during this construction period. Effects to CCC steelhead and CCC coho salmon critical habitat include the temporary impacts of dewatering and sediment mobilization noted above, and long-term effects of the construction of a fishway in the stream channel. The potential effects of these activities are presented in detail below.

A. Fish Collection and Relocation

To facilitate construction of the project, 50 feet of channel will be temporarily dewatered at the project site. The project proposes to collect and relocate fish in this area before and during dewatering to avoid fish stranding and exposure to construction activities. Juvenile steelhead and other fish will be captured by electrofishing and hand-held nets. Fish within the 50 linear feet of channel in the immediate project area will be captured and then transported by a qualified fisheries biologist for relocation to a site in Arroyo Corte Madera upstream or downstream of the construction zone.

Limited data is available to estimate the number of steelhead that may encountered during relocations and dewatering activities. Surveys by Leidy in July 1997 are the most current and reliable estimate of abundance. Leidy *et al.* (2005b) observed 2 to 25 juvenile steelhead per 100 linear feet of channel. Based on this information, the length of area to be dewatered and the time of year (summer low flow) NMFS expects the maximum number of steelhead that will be captured and relocated from the action area to be 15 pre-smolting juvenile steelhead.

Fish relocation activities pose a risk of injury or mortality to rearing juvenile salmonids. Any fish collecting gear, whether passive (Hubert 1996) or active (Hayes *et al.* 1996) has some associated risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish capture varies widely, depending on the method used, the ambient conditions, and the expertise and experience of the field crew. Since fish relocation activities will be conducted by qualified fisheries biologists following both CDFG and NMFS Electrofishing guidelines (NMFS 2000), direct effects to, and mortality of juvenile salmonids during capture will be minimized.

Based on information from other relocation efforts, NMFS estimates injury and mortalities will be less than three percent of those steelhead that are relocated. Data on fish relocation efforts since 2004 shows most mortality rates are below three percent for steelhead (CDFG 2007; 2008; 2009; 2010; Collins 2004). Fish that avoid capture during relocation effects may be exposed to risks described in the following section on dewatering.

Although sites selected for relocating fish should have similar water temperature as the capture sites and should have ample habitat, in some instances relocated fish may endure short-term stress from crowding at the relocation sites. Relocated fish may also have to compete with other fish causing increased competition for available resources such as food and habitat. Frequent responses to crowding by steelhead include emigration and reduced growth rates (Keeley 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. NMFS cannot accurately estimate the number of fish affected by competition, but does not believe this impact will adversely affect the survival chances of individual steelhead, or cascade through the watershed population of these species based on the small area that will likely be affected and the small number of steelhead likely to be relocated.

Sufficient habitat appears to be available adjacent to the action area to sustain fish relocated without crowding other juvenile steelhead.

B. Project Site Dewatering

Cofferdams consisting of sand bags, gravel bags or an inflatable bag will be used to temporarily divert flows around the work site during construction. The flow of Arroyo Corte Madera will be diverted into a pipeline to bypass the construction zone. As described above, the project will require dewatering of approximately 50 linear feet of creek channel in the action area. NMFS anticipates temporary changes to instream flow within and downstream of the project site during dewatering prior to construction. These fluctuations in flow are anticipated to be small, gradual, and short-term. Once the actual dewatering operation is completed, stream flow above and below the work site should be the same as free-flowing pre-project conditions except within the dewatered reach where stream flow is bypassed. Stream flow diversion and project work area dewatering are expected to cause temporary loss, alteration, and reduction of aquatic habitat. Stream flow diversions could harm individual rearing juvenile steelhead by concentrating or stranding them in residual wetted areas before they are relocated. Rearing steelhead could be killed or injured if crushed during construction of the water bypass system; however, fish relocation effects are expected to remove the majority of fish in the area and direct mortality is expected to be minimal.

Juvenile steelhead that avoid capture in the project work area will likely die during dewatering activities due to desiccation or thermal stress. Due to the pre-dewatering fish relocation efforts to be performed by qualified biologists, NMFS expects that the number of juvenile steelhead that will be killed as a result of stranding during dewatering activities will not exceed one percent of the fish within the action area prior to dewatering. Using the data from Arroyo Corte Madera described above, NMFS estimates no more than one (1) juvenile steelhead will remain in the dewatered area and be subject to these effects.

The temporary cofferdams and water diversion structure in the stream are not expected to impact juvenile steelhead movements in Arroyo Corte Madera beyond typical summer low-flow conditions. NMFS expects the cofferdams will restrict movement of juvenile steelhead in a manner similar to the normal seasonal isolation of pools by intermittent flow conditions that typically occur during summer within the creek as described by Rich and Associates (1995). Although steelhead probably do not always experience intermittent flows in the action area during the summer, stream flow becomes very low and riffle areas very shallow. Considering the seasonal low flow and dry streambed conditions experienced by juvenile steelhead in Arroyo Corte Madera, the limited duration of water diversion (6-10 weeks) is unlikely to adversely affect individual steelhead rearing upstream or downstream of the site during construction. Based on habitat conditions adjacent to the action area, NMFS expects these fish will be able to find food and cover upstream or downstream of the project reach as needed during the 6-10 weeks of project construction.

Benthic (bottom dwelling) aquatic macroinvertebrates within the project sites 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 (6-10 weeks) and the dewatered reach is relatively small (about 50 feet). Rapid recolonization (typically one to two months) of disturbed areas by macroinvertebrates is expected following rewatering (Cushman 1985; Harvey 1986; Thomas 1985). In addition, the effect of macroinvertebrate loss on juvenile salmonids is likely to be negligible because food from upstream sources (via drift) would be available downstream of the dewatered areas since stream flow will be bypassed around the project work site. Food sources derived from the riparian zone will not be affected by the project. Based on the foregoing, the loss of aquatic macroinvertebrates as a result of dewatering activities is not expected to adversely affect threatened CCC steelhead.

C. Toxic Chemicals

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

The project has incorporated measures which reduce the chances of toxins entering streams. These measures would ensure that instream construction work only occurs during the dry season and that heavy equipment will only be operated in a dry creek bed. Pollution control measures, such as storing fuels, lubricants, and solvents and refueling and servicing vehicles outside of the stream bed will be implemented. Due to these measures, NMFS expects that accidents will be minimized and toxic chemical contamination of the action area will be minimized to levels which are unlikely to adversely affect fish.

D. Sedimentation and Turbidity

The proposed action will result in the disturbance of the streambed and banks for equipment access and construction. In-stream and near-stream construction activities may cause temporary increases in turbidity (reviewed in Furniss *et al.* 1991, Reeves *et al.* 1991, and Spence *et al.* 1996). NMFS anticipates construction activities by this project may result in small short-term increases in turbidity during rewatering and subsequent higher flows caused by winter storms after construction is completed.

Sediment may affect fish by a variety of mechanisms. High concentrations of suspended sediment can disrupt normal feeding behavior and efficiency (Berg and Northcote 1985; Bjornn *et al.* 1977; Cordone and Kelley 1961), reduce growth rates (Crouse *et al.* 1981), and increase plasma cortisol levels (Servizi and Martens 1992). High turbidity concentrations can reduce dissolved oxygen in the water column, result in reduced respiratory functions, reduce tolerance to diseases, and can also cause fish mortality (Berg and Northcote 1985; Gregory and Northcote 1993; Sigler *et al.* 1984; Velagic 1995; Waters 1995). Increased sediment deposition can fill pools and reduce the amount of cover available to fish, decreasing the survival of juveniles (Alexander and Hansen 1986).

Although sediment and turbidity may affect listed salmonids, sedimentation and turbidity levels associated with this project are not expected to rise to the levels discussed in the previous paragraph. Monitoring of projects with similar bed and bank disturbance (newly replaced culverts within Humboldt County) generally detailed temporary increases in turbidity following winter storm events (County of Humboldt 2002; 2003; 2004); the measured turbidity was generally less than the turbidity threshold commonly cited as beginning to cause minor behavioral changes (Bisson and Bilby 1982, Sigler *et al.* 1984), and always less than turbidity levels necessary to injure or kill salmonids.

For this project, minimal amounts of disturbance are anticipated because the channel is entirely concrete-lined. The project will also stabilize an actively failing retaining wall on the creek bank. During construction, sediment input to the creek is expected to be minimal, because the project proposes to work from a constructed pad on the upper bank. NMFS does not anticipate elevated sediment levels associated with this project to result in harm, injury, or behavioral impacts that could reduce survival chances for threatened CCC steelhead in the action area.

E. Critical Habitat Effects

Arroyo Corte Madera is designated critical habitat for CCC steelhead and CCC coho salmon. PCEs of designated critical habitat for CCC steelhead in freshwater include sites for spawning, rearing, and migration. Essential features of these sites include spawning gravels, water quality and quantity, natural cover including large substrate and aquatic vegetation, forage species, and migratory corridors free of obstructions (70 FR 52488). Essential features of designated critical habitat for coho salmon in freshwater consist of 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 24049).

The potential effects of this project to designated critical habitat include the temporary loss of rearing sites during dewatering and minor, short-term disturbance of the bed and banks during construction. As discussed above, steelhead within the dewatered area will be relocated and sufficient habitat exists adjacent to the work site to support these individuals. The temporary loss of 50 linear feet of channel for 6-10 weeks during construction is not expected to impair the function of these essential physical and biological features associated with critical habitat in the

action area because these features will be available to steelhead once construction is complete.

Upon completion of the project's fishway, upstream passage for adult and juvenile steelhead will be greatly improved. The existing concrete dam is not a complete barrier to upstream passage, but adults are likely delayed when stream flows in Arroyo Corte Madera are low to moderate. The concrete apron below the dam does not provide a pool with sufficient depth for steelhead to stage and jump over the 4.5-foot high dam. The concrete apron will be entirely removed by the proposed project and the new step pool fishway will be constructed in its place. The three step pools with a 12-inch drop in water surface elevation will create easy access for adult steelhead to pass upstream under a wide range of flows. Each step pool will be about 12 feet in length and provide for areas with suitable water depth and velocity for staging and jumping. Larger juvenile steelhead should also be capable of negotiating the 12-inch drops to access areas upstream under most flow conditions. The project's construction of a fishway will significantly improve steelhead access to areas with suitable spawning and rearing habitat in upper Arroyo Corte Madera.

The replacement of the retaining wall will maintain the hardscape condition of the stream bank in this reach. The existing Arroyo Corte Madera channel in the action area has no ability to meander due to the concrete-lined channel. The proposed replacement of the retaining wall will extend the life of this bank hardening, but will not make the existing constricted condition worse. Natural geomorphic processes in and near the action area are severely limited by extensive development along the upper banks of Arroyo Corte Madera. Due to existing residential development, the channel of Arroyo Corte Madera within the action is likely to remain confined to its current alignment.

Under existing conditions, there are few gravels and other materials on the bed of the concrete-lined channel bottom. The concrete precludes spawning by steelhead and the bed lacks cover for small fish. The fishway is expected to collect gravel and other bedload materials in the step pools. Post-project, accumulated sediments will provide cover small fish and provide a substrate for establishment of aquatic invertebrates which become a food source for juvenile steelhead.

For the above reasons, the project's construction effects on critical habitat are considered minimal and post-construction, the project is expected to significantly improve fish passage conditions in the action area. The failing retaining wall in the action area will be stabilized and concrete debris in the channel removed. Existing native riparian plants and trees at project site will be retained. Overall, the project is not expected to degrade PCEs within the action area to the extent that the value of critical habitat will be reduced. Migration features of critical habitat will be significantly improved with construction of the fishway.

VII. CUMULATIVE EFFECTS

Cumulative effects are defined in 50 CFR §402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation". Any future Federal actions will be reviewed through separate section 7 consultation processes and not considered here.

NMFS does not anticipate any cumulative effects in the action area other than those ongoing actions already described in the Environmental Baseline above, and resulting from climate change. Given current baseline conditions and trends, NMFS does not expect to see significant improvement in habitat conditions in the near future due to existing land and water development in the watershed. In the long term, climate change may produce temperature and precipitation changes that may adversely affect steelhead habitat in the action area. Because this project will improve migration conditions under low and moderate stream flows, it may provide some increased resistance to climate change.

VIII. INTEGRATION AND SYNTHESIS

CCC steelhead are listed as threatened. Based on the extensive loss of historic habitat due to dams, and the degraded condition of remaining spawning and rearing areas, CCC steelhead populations in watersheds that drain to San Francisco Bay, including Arroyo Corte Madera, are likely unviable in the long-term absent efforts to improve and restore their habitat. Steelhead occur in Arroyo Corte Madera in densities and abundance lower than historic conditions. Spawning and rearing habitat in the creek, where it is accessible to steelhead, remains in good condition relative to habitat in nearby creeks. Juvenile CCC steelhead are expected to be present within the 150-foot long action area in Arroyo Corte Madera during construction. The number of individuals is expected to be as high as 15 juvenile steelhead. However, the juvenile steelhead present likely make up a very small proportion of steelhead in Arroyo Corte Madera watershed, and high quality habitat conditions for summer rearing steelhead occur in areas upstream and downstream of the action area. Due to the timing of the proposed action, no adult steelhead or migrating steelhead smolts will be adversely affected by the project.

The creek will be temporarily dewatered and disturbed during construction of the retaining wall and fishway. Adverse effects to habitat, due to project construction, are expected to be short-term and associated with minor disturbances to the streambed, bank, and flow of the stream. Before and during dewatering the site for construction, fish will be collected and relocated from the work area. Experienced fish biologists are expected to work effectively and have low steelhead injury and mortality rates during fish collections. Fish that elude capture and remain in the project area during construction activities will likely be lost to thermal stress or crushed by heavy equipment, but this number is not expected to exceed one (1) individual. Based on the low mortality rates for similar dewatering and fish relocation efforts, NMFS anticipates few juvenile steelhead will be harmed or killed during implementation of this project. Anticipated mortality

from electrofishing is expected to not exceed two (2) percent Because no more than 15 juvenile steelhead are likely to be present, NMFS expects no more than one (1) juvenile steelhead will be harmed or killed by electrofishing and dewatering. Due to the relatively large number of juveniles produced by each spawning pair, and availability of good spawning and rearing habitat elsewhere in the watershed, steelhead spawning in the Arroyo Corte Madera watershed in future years are expected to produce enough juveniles to replace the few that may be lost at the project site due to relocation and dewatering. It is unlikely that the small potential loss of juveniles by this project will impact future adult returns.

Adverse effects to designated critical habitat for CCC steelhead and CCC coho salmon are minor and/or temporary. Habitat space will be temporarily lost for the duration of in-channel construction. Minor amounts of sediment and turbidity will be generated by construction. The project is expected to maintain existing riparian vegetation and enhance upstream fish passage. The failing retaining wall will be replaced and broken concrete rubble removed from the channel. The existing concrete dam will become fully passable under a wide-range of flow conditions with the construction of the step-pool fishway. The channel within the action area will remain concrete-lined and the current degraded condition of habitat features, other than fish passage, will not be altered by the project.

Regarding future climate change effects in the action area, California could be subject to higher average summer air temperatures and lower total precipitation levels. .Reductions in the amount of precipitation would reduce stream flow levels in Northern and Central Coastal California rivers. For this project, construction would be completed no later than October 15, 2012, and the above effects of climate change are unlikely to be detected within that time frame. The short-term effects of project construction will have completely elapsed prior to these climate change effects. Long-term benefits to habitat in the action area through the project's construction of a fishway are anticipated to provide some increased resistance to climate change.

IX. CONCLUSION

After reviewing the best available scientific and commercial data, the current status of CCC steelhead, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the proposed Redwood Lodge retaining wall and fishway project on Arroyo Corte Madera is not likely to jeopardize the continued existence of threatened CCC steelhead.

After reviewing the best available scientific and commercial data, the current status of the critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' opinion that the construction of the Redwood Lodge retaining wall and fishway in Arroyo Corte Madera is not likely to adversely modify or destroy critical habitat for CCC steelhead and CCC coho salmon.

X. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS as an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by the Corps for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions, or (2) fails to require its designees to adhere to the terms and conditions of the incidental take statement, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the actions and its impact on the species to NMFS as specified in the incidental take statement (50 CFR §402.14(I)(3)).

A. Amount or Extent of Take

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

The number of threatened steelhead that may be incidentally taken during project activities is expected to be small, and limited to the pre-smolt juvenile life history stage. Take is anticipated to occur during fish relocation and dewatering in a 50-foot reach at the project site during July and August. The number of juvenile steelhead encountered during dewatering and fish relocation is anticipated to be no more than 15 individuals. NMFS expects that no more than two (2) juvenile steelhead within a 50-foot dewatering area of Arroyo Corte Madera will be injured or killed during fish relocation and dewatering activities.

B. Effect of the Take

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

C. Reasonable and Prudent Measures

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

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

2. Undertake measures to minimize harm to steelhead resulting from construction of the project.

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

D. Terms and Conditions

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

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

    a. The qualified fisheries biologists conducting fish relocation and dewatering must monitor the construction site during placement and removal of cofferdams, channel diversions, and access ramps to ensure that any adverse effects to salmonids are minimized. The biologists must be on site during all dewatering events to capture, handle, and safely relocate steelhead.

    b. Steelhead must be handled with extreme care and kept in water to the maximum extent possible during rescue activities. All captured fish must be kept in cool, shaded, aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream, and fish must not be removed from this water except when released. To avoid predation, the biologists must have at least two containers and segregate young-of-year fish from larger age-classes and other potential aquatic predators. Captured salmonids 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.

    c. If any salmonids are found dead or injured, the biologist must contact NMFS biologist Gary Stern by phone immediately at (707) 575-6060 or the NMFS Santa Rosa Area Office at 707-575-6050. The purpose of the contact is to review the

activities resulting in take and to determine if additional protective measures are required. All salmonid mortalities must be retained, placed in an appropriately-sized sealable plastic bag, labeled with the date and location of collection, fork length, and be frozen as soon as possible. Frozen samples must be retained by the biologist until specific instructions are provided by NMFS. The biologist may not transfer biological samples to anyone other than the NMFS Santa Rosa Area Office without obtaining prior written approval from the NMFS Santa Rosa Area Office, Supervisor of the Protected Resources Division. Any such transfer will be subject to such conditions as NMFS deems appropriate.

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

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

3. The following term and condition implements reasonable and prudent measure 3:

   a. The Corps or their permittees 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 Santa Rosa Area Office, Attention: San Francisco Bay Branch Supervisor, 777 Sonoma Avenue, Room 325, Santa Rosa, California, 95404-6528. The report must contain, at a minimum, the following information:

      i. **Construction related activities** -- The report must include the dates construction began and was completed; a discussion of any unanticipated effects or unanticipated levels of effects on salmonids, 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.

      ii. **Fish Relocation** -- The report must include a description of the location from which fish were removed and the release site including photographs; the date and time of the relocation effort; pertinent information describing the where fish were relocated (e.g. water temperature, dissolved oxygen levels, stream flow, etc.), a description of the equipment and methods used to collect, hold, and transport salmonids; if an electrofisher was used for fish collection, a copy of the logbook must be included; the number of fish relocated by species; the number of fish injured or killed by species and a brief narrative of the circumstances surrounding ESA-listed fish injuries or mortalities; and a description of any problems which may have arisen during the relocation

activities and a statement as to whether or not the activities had any unforeseen effects.

XI. REINITIATION NOTICE

This concludes formal consultation for the proposed replacement of a retaining wall and construction of a fishway at the Redwood Lodge on Arroyo Corte Madera del Presidio in Mill Valley, California. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of incidental take is exceeded, formal consultation must be reinitiated immediately.

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