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

October 4, 2019 **Refer to NMFS No:** WCRO-2019-02240

James Mazza
Acting Chief, Regulatory Division
Department of the Army
San Francisco District, Corps of Engineers
450 Golden Gate Avenue, 4th Floor
San Francisco, California 94102-3406

Re: Endangered Species Act Section 7(a)(2) Biological Opinion for the Bank Stabilization Project at 79 and 83 Mt. Muir Court in the City of San Rafael, Marin County, California (Corps File No. 2005-29731N)

Dear Mr. Mazza:

Thank you for your letter of August 5, 2019, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 *et seq*.) for the proposed bank stabilization project on Miller Creek at 79 and 83 Mt. Muir Court, City of San Rafael, Marin County, California (Project). The Corps of Engineers (Corps) proposes to provide authorization for the Project pursuant to Section 404 of the Clean Water Act of 1972, as amended (33 U.S.C. § 1344 *et seq*.), to K. Harding, G. Borders, C. Elgie, and M. Elgie, property owners of 79 and 83 Mount Muir Court.

Updates to the regulations governing interagency consultation (50 CFR part 402) will become effective on October 28, 2019 [84 FR 44976 and 84 FR 50333]. Because this consultation was pending and will be completed prior to that time, we are applying the previous regulations to the consultation. However, as the preamble to the final rule adopting the new regulations noted, "[t]his final rule does not lower or raise the bar on section 7 consultations, and it does not alter what is required or analyzed during a consultation. Instead, it improves clarity and consistency, streamlines consultations, and codifies existing practice." Thus, the updated regulations would not be expected to alter our analysis.

Thank you, also, for your request for 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 the proposed action. NMFS reviewed the proposal for potential effects on EFH, including conservation measures and any determination you made regarding the potential effects of the action. This review was pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation. In this case, NMFS concluded that EFH is not present in the action area and would not be affected. Thus, consultation under the MSA is not required for this action.

The enclosed biological opinion is based on our review of the proposed Project and describes NMFS' analysis of the effects on threatened Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) in accordance with section 7 of the ESA. The Project's action area is not located within designated critical habitat.

In the enclosed biological opinion, NMFS concludes the Project is not likely to jeopardize the continued existence of threatened CCC steelhead. However, NMFS anticipates take of CCC steelhead will occur as a result of project construction. An incidental take statement with non-discretionary terms and conditions is included with the enclosed biological opinion.

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

Please contact Daniel Logan of the NMFS North-Central Coast Office in Santa Rosa, California at (707) 575-6053, or dan.logan@noaa.gov if you have any questions concerning this section 7 consultation, or if you require additional information.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: Robert Morganstern, Corps of Engineers, San Francisco
Xavier Fernandez, San Francisco Regional Water Quality Control Board, Oakland
Karen Weiss, California Department of Fish and Wildlife, Fairfield, California
Copy to ARN File #151422WCR2019SR00177

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion

Bank Stabilization Project at
79 and 83 Mt. Muir Court, City of San Rafael

NMFS Consultation Number: WCRO-2019-02240

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	No	No

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

Issued By:

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Date: October 4, 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 650 California St 7th Floor, San Francisco, CA 94108the Endangered Species Act (ESA) of 1973 (16 USC 1531 *et seq*.), and implementing regulations at 50 CFR 402.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The biological opinion will be available through the NOAA Institutional Repository (https://repository.library.noaa.gov/), after approximately two weeks. A complete record of this consultation is on file at the NMFS North-Central Coast Office in Santa Rosa, California (ARN # 151422WCR2019SR00177).

1.2 Consultation History

By letter dated August 5, 2019, the U.S. Army Corps of Engineers (Corps) requested initiation of formal consultation with NMFS, North-Central Coast Office for a proposed bank stabilization project (Project) by Geomorph Design on Miller Creek at 79 and 83 Mount Muir Court, San Rafael, California. Additional information was provided to NMFS on September 9 and 10, 2019, by Geomorph Design, a consulting engineering firm hired by K. Harding, G. Borders, C. Elgie, and M. Elgie, property owners of 79 and 83 Mount Muir Court. On September 9, 2019, Geomorph Design provided information on a new construction access pathway for the Project from Mt. Palomar Court. On September 10, 2019, Geomorph Design provided a revised biological assessment for the Project. NMFS determined it had sufficient information to initiate consultation with the Corps for the Project on September 10, 2019.

1.3 Proposed Federal Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). The Corps proposes to provide authorization under Nationwide Permit 13 pursuant to Section 404 of the Clean Water Act of 1972, as amended (33 U.S.C. § 1344 *et seq*.) (Corps File No. 2018-00086S) to K. Harding, G. Borders, C. Elgie, and M. Elgie (Applicants) to stabilize the southern bank of Miller Creek at 79 and 83 Mount Muir Court in San Rafael, California.

1.3.1 Project Description

The purpose of this Project is to permanently stabilize the streambank of Miller Creek adjacent to private residences at 79 and 83 Mount Muir Court in San Rafael, California. Three failed bank stabilization actions were undertaken at this site in 2005, 2008, and 2010, respectively. Portions of the previous bank stabilization structures have failed and fallen into the creek or been removed, and currently, the streambank is overly steep and unstable, and likely to fail

catastrophically. The Project is designed to stabilize the toe of the bank of Miller Creek in a manner that protects and enhances existing mature riparian vegetation and enhances aquatic habitat. The finished bank stabilization will be about 50 linear feet long.

The Project proposes to install a vegetated rock slope at the toe of the southern streambank to provide erosion protection without removing the existing mature alder (*Alnus* spp.) and willow (*Salix* spp.) vegetation present on site. Also, the Project proposes to add three log rootwads to the rock slope at the toe of the bank. The rootwad ends would be set below the summer low-flow water level to encourage corner pool scouring and create physical cover for salmonids. The Project will install a stormwater drainage "French drain" at the top of bank daylighting in the finished face of the rock riprap slope near the low-flow water line. Further, the Project will restore the pre-failure channel x-section of Miller Creek by removing accumulated native sandy gravel alluvium from the opposite bank. This material will be placed on the mid-bank above the completed rock slope toe protection to build up the bank at 2(H):1(V) slope in and amongst the existing willow thicket vegetation. Willow cuttings will be buried just below the finished surface of the fill slope material to augment and enhance the existing willow thicket. The work will be completed using rubber-tired heavy equipment (excavator and material handler) operated on the dry and the dewatered portion of the channel bed. In order to allow equipment access to the site, a 565-foot long access will be constructed connecting the work site to the maintenance right-of-way on Mt. Palomar Court. To minimize access pathway width and associated vegetation impacts, the access route will be about 6-feet wide – only wide enough to allow access for a rubber-tracked mini-excavator.

Prior to the initiation of construction activities, the Project will create a dry in-channel work area in approximately 125 linear feet of Miller Creek by installing cofferdams, upstream and downstream of the construction zone, using placing sandbags and plastic sheeting. Streamflow will be diverted past the worksite through an 8-inch diameter pipe. A qualified biologist will capture and relocate fish from the area between the two cofferdams prior to and during dewatering.

Project construction will require the excavation of a 4-foot-wide, 4-foot-deep, 50-foot-long keyway trench down to minimum bottom elevation 108.0 feet. This trench is positioned so that subsequent rip-rap slope construction will result in achieving minimum 3-foot width in front of top of failed temporary post-and-wire revetment retaining wall and 30-foot-wide minimum width channel at bankfull water surface elevation. The keyway trench will be lined with geotextile fabric and then filled with 1/2-ton minimum rock rip-rap up to elevation +/- 113.0 feet. Five-foot-long live willow post pole and brush cuttings will be installed on 4-foot centers along entire 50-foot-long rip-rap face, and extending through holes cut in the geotextile fabric into native bank material backfill augmented with fine granular material behind the rip-rap. Cuttings shall be placed on bedding of native bank material placed by hand on joints in the rip-rap, then also covered with soil material and wetted with creek water before subsequent layers of rip-rap are added above the cuttings in forming the remainder of the rip-rap structure. Cuttings shall extend about 4-6 inches creekward of the finished face of the rip-rap.

The Project will place 1/2-ton minimum rip-rap over the cuttings horizon at 1(H):1(V) slope to achieve the minimum 30-foot-wide channel at bankfull water surface elevation (118.0 feet) and

extending up to top elevation 120.0 feet along the entire length of rip-rap slope. All rip-rap will be placed in manner that avoids damaging existing alder trees rooted at the base of the failed retaining wall so that the trees are stabilized within the rock matrix. The storm drain pipe will be installed to daylight at the finished rock face for connection to the top of bank storm drainage trench shown in plans. Fiber roll on soil lift will be installed along length of the top of finished rip-rap. Live willow cuttings will be buried just beneath the top finished surface of the fill material and cover with biodegradable erosion control fabric in places where the vegetation cover can be practically augmented.

Within an area of about 260 square feet, the Project proposes to remove approximately 26 cubic yards of sandy gravel bar material from the north side of the existing low-flow channel. Some of this material likely originated from the collapsed bank. Materials will be excavated to create a uniformly 10-foot-wide low flow channel with an approximately flat channel bed that gradually slopes toward the newly installed vegetated rock slope protection. The sandy gravel bar material will not be removed from the channel, rather it will be placed on the bank above the constructed vegetated rock slope protection. The Project will install three log-rootwads on finished rock slope with rootwads at and below the lowflow water surface elevation +/- 112.5 feet NAVD88 and fasten logs in two places to 3/4-ton or larger rock rip-rap pieces.

The Project will include standard erosion control best management practices, such as fiber rolls and silt curtains, and will include planting of the following appropriate, native California plants: American elderberry (*Sambucus canadensis*), dogwood (*Cornus* spp.), California buckeye (*Aesculus californica*), and willow. Construction of the Project is scheduled to occur between September 30 and November 15, 2019. Work activities associated with construction are anticipated to occur over a period of 3 to 4 weeks.

Additional project design details are found in the following documents: (1) Biological Resource Assessment for Miller Creek Bank Stabilization Project at 79 and 83 Mount Muir Court, created by Coast Range Biological; (2) Revised Biological Resource Assessment for Miller Creek Bank Stabilization Project at 79 and 83 Mount Muir Court, created by Coast Range Biological; (3) Summary Project Description Report for Miller Creek at 79 and 83 Mt. Muir Court, Proposed Creek Bank Erosion Protection, created by Geomorph Designs; (4) Mitigation and Monitoring Plan for Miller Creek at 79 and 83 Mt. Muir Court, created by Geomorph Designs; and (5) Permit Level Design Plans for Miller Creek at 79 and 83 Mt. Muir Court Bank Erosion Protection Project, created by Geomorph Designs. Geomorph Designs and Coast Ridge Ecology are consulting firms hired by the Applicants.

1.3.2 Interrelated or Interdependent Actions

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

2 ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

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

2.1 Analytical Approach

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

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

The designation of critical habitat for Central California Coast (CCC) steelhead uses the term primary constituent element (PCE) or essential features. The new critical habitat regulations (81 FR 7414) replace this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a ''destruction or adverse modification'' analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

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

- Identify the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.

- Integrate and synthesize the above factors by: (1) Reviewing the status of the species and critical habitat; and (2) adding the effects of the action, the environmental baseline, and cumulative effects to assess the risk that the proposed action poses to species and critical habitat.
- Reach a conclusion about whether species are jeopardized or critical habitat is adversely modified.
- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.1.1 Use of Best Available Scientific and Commercial Information

To conduct the assessment presented in this opinion, 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 potential effects of the proposed activities at 79 and 83 Mount Muir Court 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:

- Biological Resource Assessment for Miller Creek Bank Stabilization Project at 79 and 83 Mount Muir Court, San Rafael, California. Prepared for K. Harding, G. Borders, C. Elgie, and M. Elgie by Coast Range Biological. August 2019. 59 pages.
- Revised Biological Resource Assessment for Miller Creek Bank Stabilization Project at 79 and 83 Mount Muir Court, San Rafael, California. Prepared for K. Harding, G. Borders, C. Elgie, and M. Elgie by Coast Range Biological. September 2019. 61 pages.
- Summary Project Description Report for Miller Creek at 79 and 83 Mt. Muir Court, Proposed Creek Bank Erosion Protection. Prepared for K. Harding, G. Borders, C. Elgie, and M. Elgie by Geomorph Designs. June 2019. 17 pages.
- Mitigation and Monitoring Plan for Miller Creek at 79 and 83 Mt. Muir Court, Proposed Creek Bank Erosion Protection. Prepared for K. Harding, G. Borders, C. Elgie, and M. Elgie by Geomorph Designs. July 2019. 5 pages.
- Permit Level Design Plans for Miller Creek at 79 and 83 Mt. Muir Court Bank Erosion Protection Project. Prepared for K. Harding, G. Borders, C. Elgie, and M. Elgie by Geomorph Designs. August 5, 2019. 4 sheets.

For information that has been taken directly from published, citable documents, those citations have been reference 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 in Santa Rosa, California (Administrative Record Number 151422WCR2019SR00177).

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and

recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential PBFs that help to form that conservation value.

2.2.1 Listed Species

This biological opinion analyzes the effect of the proposed bank stabilization project at 79 and 83 Mount Muir Court, San Rafael, California on CCC steelhead in Miller Creek. CCC steelhead are listed as threatened under the ESA (71 FR 834, January 5, 2006). The CCC steelhead distinct population segment (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. Miller Creek is not designated critical habitat for CCC steelhead (September 2, 2005; 70 FR 52488).

2.2.2 Steelhead General Life History

Steelhead are anadromous fish, 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. 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 (Shapovalov and Taft 1954, Barnhart 1986, Busby *et al.* 1996, McEwan 2001). Although variation occurs in coastal California, steelhead usually live in freshwater for 1 to 2 years in central California, then spend 2 or 3 years in the ocean before returning to their natal stream to spawn. Steelhead may spawn 1 to 4 times over their life. Adult steelhead returning from the ocean to the Miller Creek watershed typically immigrate to freshwater between December and April, peaking in January and February, and juveniles migrate as smolts from the watershed to the ocean from January through June, with peak emigration occurring in April and May (Fukushima and Lesh 1998). Given the proposed construction period between late September and November 15, only juvenile steelhead are likely to be present in the action area during construction activities.

Steelhead fry rear in edgewater habitats and move gradually into pools and riffles as they grow larger. Cover is an important habitat component for juvenile steelhead, both as a velocity refuge and as a means of avoiding predation (Shirvell 1990, Meehan and Bjornn 1991). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. Rearing steelhead juveniles prefer water temperatures of 7.2-14.4 degrees Celsius (°C) and have an upper lethal limit of 23.9°C (Barnhart 1986, Bjornn and Reiser 1991). They can survive in water up to 27°C with saturated dissolved oxygen conditions and a plentiful food supply. Fluctuating diurnal water temperatures also aid in survivability of salmonids (Busby *et al.* 1996). Juvenile steelhead emigrate episodically from natal streams during fall, winter, and spring high flows, to the ocean to continue rearing to maturity.

Adults returning to spawn may migrate several miles, hundreds of miles in some watersheds, to reach their natal streams. Although spawning typically occurs between January and May, the specific timing of spawning may vary a month or more among streams within a region, and within streams interannually. Spawning (and smolt emigration) may continue through June (Busby *et al.* 1996). Female steelhead dig a nest in the stream and then deposit their eggs. After fertilization by the male, the female covers the nest with a layer of gravel. Steelhead do not necessarily die after spawning and may return to the ocean, sometimes repeating their spawning migration one or more years. The embryos incubate within the nest. Hatching time varies from about three weeks to two months depending on water temperature. The young fish emerge from the nest about two to six weeks after hatching.

2.2.3 Status of CCC Steelhead

Historically, approximately 70 populations of steelhead are believed to have existed in the CCC steelhead DPS (Spence *et al.* 2008). Many of these populations (approximately 37) were independent, or potentially independent, meaning they historically had a high likelihood of surviving for 100 or more years absent anthropogenic impacts (Bjorkstedt *et al.* 2005). The remaining populations were dependent upon immigration from nearby CCC steelhead DPS populations to ensure their persistence (McElhaney *et al.* 2000, Bjorkstedt *et al.* 2005). While historical and current data of abundance are limited, CCC steelhead DPS 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). Near the end of the 20th century, McEwan (2001) estimated that the wild steelhead population in the Russian River watershed was between 1,700 and 7,000 fish. 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, Soquel, and Aptos creeks) of individual run sizes of 500 fish or less (62 FR 43937). However, as noted in Williams *et al.* (2016) data for CCC steelhead populations remain scarce outside of Scott Creek, which is the only long-term dataset and shows a significant decline. Short-term records indicate the low but stable assessment of populations is reasonably accurate; however, it should be noted that there is no population data for any populations outside of the Santa Cruz Mountain stratum, other than hatchery data from the Russian River.

Although available time series data sets are too short for statistically robust analysis, the information available indicates CCC steelhead populations have likely experienced serious declines in abundance, and apparent long-term population trends suggest a negative growth rate. This would indicate the DPS may not be viable in the long term, and 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 have maintained a wide distribution throughout the DPS, roughly approximating the known historical distribution, CCC steelhead likely possess a resilience that could slow their decline relative to other salmonid DPSs or ESUs in worse condition. 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), a conclusion that was consistent with a previous assessment (Busby *et al.* 1996) and supported by the NMFS Technical Recovery Team work (Spence *et al.* 2008). On January 5, 2006, NMFS issued a final determination that the CCC steelhead DPS is a threatened species, as previously listed (71 FR 834).

Although numbers did not decline further during 2007/08, the 2008/09 adult CCC steelhead return data indicated a significant decline in returning adults across their range. Escapement data from 2009/2010 indicated a slight increase; however, the returns were still well below numbers observed within recent decades (Jeffrey Jahn, NMFS, personal communication, 2010).

In the Russian River, analysis of genetic structure by Bjorkstedt *et al.* (2005) concluded previous among-basin transfers of stock, and local hatchery production in interior populations in the Russian River likely has altered the genetic structure of the Russian River populations. Depending on how "genetic diversity" is quantified, this may or may not constitute a loss of overall diversity. In San Francisco Bay streams, reduced population sizes and fragmentation of habitat has likely led to loss of genetic diversity in these populations. More detailed information on trends in CCC steelhead DPS abundance can be found in the following references: Busby *et al.* 1996, NMFS 1997, Good *et al.* 2005, and Spence *et al.* 2008.

The status review by Williams *et al.* (2011) concluded that steelhead in the CCC steelhead DPS remain "likely to become endangered in the foreseeable future" as new information released since Good *et al.* 2005 did not appear to suggest a change in extinction risk. The most recent status review (Williams *et al.* 2016) reached the same conclusion. On May 26, 2016, NMFS affirmed no change to the determination that the CCC steelhead DPS is a threatened species (81 FR 33468), as previously listed (76 FR 76386).

2.2.4 CCC Steelhead Critical Habitat Status

Critical habitat was designated for CCC steelhead on September 2, 2005 (70 FR 52488). In designating critical habitat, NMFS considers, among other things, the essential PBFs within the designated area that are essential to the conservation of the species and that may require special management considerations or protection.

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

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
2. Freshwater rearing sites with:
    a. water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
    b. water quality and forage supporting juvenile development; and
    c. 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.
3. 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.

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: 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 streambank 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 streambank erosion, 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, 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.

A final recovery plan for CCC steelhead was prepared by NMFS in October 2016 (NMFS 2016). The plan describes key threats, actions needed to achieve recovery, and measurable criteria by which NMFS will determine when recovery has been reached. Recovery plan actions are primarily designed to restore ecological processes that support healthy steelhead populations, and address the various activities that harm these processes and threaten the species' survival. The recovery plan calls for a range of actions including the restoration of floodplains and channel structure, restoring riparian conditions, improving streamflows, restoring fish passage, protecting and restoring estuarine habitat, among other actions.

2.2.5 Global Climate Change

One factor affecting the range-wide status of the CCC steelhead DPS, 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 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 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, 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 21st 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 *et al.* 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, Santer *et al.* 2011).

2.3 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for the Project consists of the streambed and banks of Miller Creek and contains the area of the access pathway, cofferdams, streambed area to be dewatered, fish relocation sites, and the channel downstream for a distance of 150 feet to include the length of waterway in which any temporary disruption to habitat (*e.g.*, fine sediment plume) and water quality might be detectable. In total, the action area includes approximately 850 linear feet of Miller Creek and additional upland areas above the top of bank where equipment staging and access will occur.

2.4 Environmental Baseline

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

Miller Creek is a direct tributary to San Pablo Bay. Miller Creek, within the action area, is an alluvial, low-gradient stream that passes through an area of suburban development. The climate within the action area is Mediterranean and receives about 40 inches of precipitation annually, with about 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.

2.4.1 Status of Steelhead and Critical Habitat in the Action Area

Leidy *et al.* (2005) and CDFG (2011) report a few observations of steelhead from Miller Creek but in locations outside of the action area of this project. Coast Ridge Ecology (2019a, 2019b) observed recently 4 juvenile steelhead, from perhaps two year classes, within the action area.

Based on current channel conditions, aquatic and riparian habitat within the action area is moderately degraded from properly functioning condition due to impacts from land-use in the watershed.

Miller Creek is not designated as critical habitat for CCC steelhead.

2.4.2 Factors Affecting the Species Environment in the Action Area

The surrounding landscape is primarily suburban development with low- to medium-density single family residential properties. Suburban development has encroached on the riparian areas adjacent to Miller Creek. Suburban development contributes to increased erosion, channel simplification, chemical toxicity from stormwater discharges, and concentrated surface runoff following precipitation events. Instream habitat conditions for steelhead have been reduced by suburban development to moderate quality. The stream is incised with steep banks and perched, abandoned floodplains exist above the top of bank. Overwinter habitat is generally fair to poor due to few secondary channels and backwater areas, but other features such as small boulders, large pieces of wood, and undercut banks provide limited refugia from high velocity flow events.

A significant amount of material that slumped from the failed bank remains in the channel and is impinging the creek's surface flow. Beyond the failed bank, that is the subject of this consultation, other smaller instances of eroding banks are evident in the immediate area. These failed banks have had hardened structures installed to try to maintain bank stability. Those hardened structures prevent natural channel migration – especially common in incised streams. Within the project area, the substrate of Miller Creek is primarily sand, gravel and cobble. The stream is dominated by riffles and pools are uncommon. Large wood pieces are uncommon in the areas upstream and downstream of the failed bank. Riffle and runs generally comprise streambed materials that are of sufficient size for quality steelhead spawning and juvenile rearing. Instream cover is provided by small boulders, large cobbles, undercut banks, small wood pieces, and riparian vegetation.

Coast Range Biological (2019a, 2019b) describes that plant community within the action area as containing two general habitats: arroyo willow thicket and landscaped/ornamental. Observations of plants within the project area include a mosaic of native trees, shrubs, non-native plants, and some invasive species. The riparian areas have been encroached by the suburban development, and the failed bank reduced the amount of riparian vegetation in the action area.

2.4.3 Previous Section 7 Consultations Affecting the Action Area

NMFS and the Corps have completed two previous section 7 consultations within the action area of this project. Both consultations were related to prior efforts by the Applicants to stabilize the streambank behind the private residences at 79 and 83 Mount Muir Court. In 2005, the

Applicants proposed installation of approximately 50 feet of a post and wire structure with revetment consisting of geotextile bags filled with gravel and cobble alluvium. The Corps and NMFS completed section 7 consultation on this initial project with a finding of not likely to adversely affect listed species and a letter of concurrence from NMFS dated September 1, 2005, was provided to the Corps (ARN #151422SWR2005SR00642).

After completion of the 2005 project, further erosion at the downstream end of the site washed away approximately 5 feet of the structure and destabilized the creek bank. NMFS and the Corps reinitiated the consultation for the Applicants' proposed repair of a 5-foot-long damaged area and extension of the structure another 10 feet downstream. NMFS and the Corps completed reinitiation of consultation with a finding of not likely to adversely affect listed species and a letter of concurrence from NMFS dated September 16, 2008, was provided to the Corps.

In 2010, the Applicants proposed installation of additional rock rip-rap on the bank. The Corps initiated a new consultation with NMFS for this project and requested concurrence with a finding of not likely to adversely affected listed species. NMFS provided the Corps with a letter of concurrence dated September 24, 2010, for the Applicants' 2010 project (ARN #151422SWR2010SR00298).

Also, NMFS has completed programmatic consultations for salmonid habitat restoration actions that include the action area of this Project. To date, no habitat restoration actions covered under existing programmatic Section 7 consultations have occurred in the action area. These programmatic consultations include the NOAA Restoration Center's restoration program and the Corps' Regional General Permit #12 programmatic consultation. Both of these consultations authorize a limited amount of take for juvenile salmonids during instream work conducted in the summer months.

Section 10(a)(1)(A) research and enhancement permits and section 4(d) limits or exceptions could potentially occur in the Miller Creek watershed, including the action area of this Project. 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. Through September 2019, no research activities authorized by these NMFS programs have occurred in Miller Creek.

2.4.4 Climate Change Impacts in the Action Area

Information discussed above in the Range-wide Status of the Species and Critical Habitat section of this opinion (Section 2.2) indicates that CCC steelhead in the action area may have already experienced some detrimental impacts from climate change. These detrimental impacts across the action area are likely to be minor because natural and local climate factors continue to drive most of the climatic conditions steelhead experience. These natural factors are likely less influential on fish abundance and distribution than anthropogenic impacts across the action area. However, in the future impacts in the action area from climate change are likely to increase as air and water temperatures warm, and precipitation rates change.

2.5 Effects of the Action

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

Construction activities associated with the bank stabilization by the Project will be limited to a single work season between late September and November 30. Effects to threatened CCC steelhead are expected during fish relocation, during work site dewatering, and from degraded water quality.

2.5.1 Fish Relocation Activities

Fish collection and relocation will be performed in coordination with dewatering prior to construction. The dewatered area within the action area will be the entire wetted surface of Miller Creek for about 125 linear feet. Coast Ridge Ecology, employed by the Applicants, proposes to collect and relocate fish to minimize the effects of dewatering the stream channel on steelhead. Before and during dewatering of the construction site, juvenile steelhead and other fish will be captured and relocated away from the work area to avoid direct mortality and minimize the possible stranding of fish in isolated pools. Fish in the immediate project area will be captured using dip nets and seines, and then transported and released to suitable instream locations outside the work area by a qualified fisheries biologist.

Steelhead relocation activities will occur during the fall low-flow period after emigrating smolts and kelts (post-spawned adults) have left the creek and prior to the adult migration and spawning season. Therefore, NMFS expects the CCC steelhead that will be captured at the 79 and 83 Mount Muir Court construction site during relocation activities will be limited to young-of-the-year and pre-smolting juveniles. Data to precisely quantify the amount of steelhead that will be relocated prior to construction are not available, but estimates can be made from available information. Recent observations by Coast Ridge Ecology (2019a, 2019b) estimated 4 juvenile steelhead reside in a pool within the channel reach to be dewatered. However, based on densities of fish reported in similar sites in Bay Area streams and the potential for many fish to be undetected by observers, the number of juvenile steelhead within the reach to be dewatered could be considerably higher. Best available information from similar sites in San Francisco Bay tributary streams, the dewatered project reach may support up to 15 juvenile steelhead and this is expected to be the maximum number that would be captured and relocated by the Project.

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, direct effects to and mortality of juvenile steelhead during capture will be minimized.

Although sites selected for relocating fish should have similar and ample aquatic habitat as in the capture sites. 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. NMFS does not expect impacts from increased competition would be large enough to adversely affect the survival chances of individual steelhead, or cascade through the watershed population based on the small area that would likely be affected and the relatively small number of individuals likely to be relocated (particularly when compared with the remainder of individuals throughout the drainage not affected by the project). As described above, sufficient habitat appears to be available Miller Creek to sustain up to 15 fish relocated by the Project without crowding of other juvenile steelhead.

Based on information from other relocation efforts, NMFS estimates injury and mortalities would be less than three percent of those steelhead that are captured and relocated. Data on fish relocation efforts in California streams since 2004 shows most mortality rates are below three percent for steelhead (Collins 2004, CDFG 2005, 2006, 2007, 2008, 2009, 2010a, 2010b). Fish that avoid capture during relocation efforts may be exposed to risks described in the following section on dewatering. NMFS expects no more than three percent of the steelhead captured by the Project for dewatering will be injured or killed during relocation activities.

2.5.2 Dewatering

The Project proposes to isolate the work area with a cofferdam and bypass streamflow around the construction site. Bypass piping will be installed to divert streamflow around the project site by gravity. Dewatering of the channel is estimated to affect up to 125 linear feet of Miller Creek. NMFS anticipates only minor temporary changes to the streamflow of creek outside of the dewatered construction area during the dewatering process. These fluctuations in flow are anticipated to be small, gradual, and short-term. Once the cofferdam and pipeline bypass are installed and operational, streamflow above and below the work site should be the same as the pre-project conditions except within the dewatered work areas where streamflow is bypassed. The dewatering of up to 125 feet of channel is expected to cause a temporary reduction in the quantity of aquatic habitat.

Juvenile steelhead that avoid capture in the project work area following relocation efforts may die due to desiccation, thermal stress, or be crushed by equipment or foot traffic if not found by biologists while water levels within the reach recede. However, due to fish relocation efforts, NMFS expects the number of juvenile steelhead that would die as a result of stranding during dewatering activities would be less than one percent of the steelhead within the work site prior to dewatering.

The temporary cofferdams and water diversion structures in the creek at the construction site are not expected to impact juvenile steelhead movements in Miller Creek beyond typical summer low-flow conditions. Steelhead experience intermittent conditions in many central California

coastal streams during summer which imped upstream and downstream movements by juveniles. The limited duration (approximately three to four weeks) in combination with the fall season timing of this project's water diversion are unlikely to adversely affect individual steelhead movements in Miller Creek.

Benthic (*i.e.*, bottom dwelling) aquatic macroinvertebrates (a salmonid prey item) within the construction site may be killed or their abundance reduced when creek habitat is dewatered (Cushman 1985). However, effects to aquatic macroinvertebrates resulting from the construction streamflow bypass and dewatering will be temporary because construction activities would be relatively short-lived and the dewatered reach is relatively small (approximately 125 linear feet of channel). Rapid recolonization (typically one to two months) of disturbed areas by macroinvertebrates is expected following channel re-watering (Cushman 1985, Thomas 1985, Harvey 1986). Based on the foregoing, NMFS does not expect the loss of aquatic macroinvertebrates as a result of dewatering activities by the Project would adversely affect CCC steelhead foraging during and after project implementation.

2.5.3 Increased Mobilization of Sediment in the Stream Channel and Water Quality

During construction, project activities at 79 and 83 Mount Muir Court would result in disturbance of the creek bed and banks for equipment access, bank and channel contouring, placement of rootwads and boulders, and for the placement/removal of the cofferdams. While the cofferdam and streamflow bypass system are in place, construction activities are not expected to degrade water quality in Miller Creek because the work area will be dewatered and isolated from the flowing waters of the creek. Post-construction, NMFS anticipates disturbed soils could affect water quality and critical habitat in the action area in the form of small, short-term increases in turbidity during re-watering (*i.e.*, cofferdam removal) and subsequent higher flow events during the first winter storms post-construction. Disturbed soils on the creek bank are easily mobilized when late fall and winter storms increase streamflow levels. Instream and near-stream 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).

Increases in sediment may 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, decreasing chances of survival. Increased sediment deposition can fill pools thereby reducing the amount of potential cover and habitat available, and smother coarse substrate particles which can impair macroinvertebrate composition and abundance (Sigler *et al.* 1984, Alexander and Hansen 1986).

Although chronic elevated sediment and turbidity levels may affect steelhead as described above, sedimentation and turbidity levels associated with this Project during cofferdam construction and removal, and the subsequent rewetting of the construction site within the action area, and during

subsequent rainfall events are not expected to rise to the levels discussed in the previous paragraph, because the project proposes soil and channel stabilization measures to prevent the mobilization of sediment. Due to the Project's proposed use of cofferdams and erosion control methods throughout the construction phase, and post-construction planting of native vegetation, NMFS anticipates there will be minimal area of disturbed, exposed soils remaining post-construction. Therefore, any resulting elevated turbidity levels would be small, only occur for a short period, and be well below levels and durations shown in the scientific literature as causing injury or harm to salmonids (see for example Sigler *et al.* 1984 or Newcombe and Jensen 1996). NMFS expects any sediment or turbidity generated by the Project would not extend more than 150 feet downstream of the work site based on the site conditions and methods used to control sediment. NMFS does not anticipate harm, injury, or behavioral impacts to CCC steelhead associated with exposure to the minor elevated suspended sediment levels that would be generated by the Project.

2.5.4 Effects on Habitat

Juvenile steelhead rearing habitat in the action area will be temporarily impacted by dewatering approximately 125 linear feet of channel respectively. The amount of physical habitat available in Miller Creek for rearing juveniles will be reduced by this amount for a period of up to four weeks. During this period, food supplies within the dewatered reach will be temporarily reduced. As discussed above, benthic (*i.e.*, bottom dwelling) aquatic macroinvertebrates may be killed or their abundance reduced when stream habitat is dewatered. However, effects to aquatic macroinvertebrates resulting from streamflow diversion and dewatering is expected to be short-term, and rapid recolonization by macroinvertebrates is expected following rewatering (Cushman 1985, Thomas 1985, Harvey 1986).

The temporary water diversion and cofferdams are not expected to adversely affect steelhead migration because the diversion will not be in place during periods of adult and smolt steelhead migration in Miller Creek. Water diversion around the worksite will be limited to the period between September 30 through November 15 when adults and smolts are no longer migrating and cofferdams will be removed prior to the beginning of adult or smolt migration of December through May (Fukushima and Lesh 1998).

The Project proposes to place rock rip-rap and vegetation over the unstable, eroding streambank to protect the site from further slippage and erosion during high flows events. In combination with existing bank stabilization in Miller Creek, the proposed action is anticipated to effect the channel by maintaining the current alignment and precluding lateral movement of the channel. Natural fluvial and geomorphic processes in the action area have been compromised by previous bank stabilization efforts. Streams transport water and sediment from upland sources to the ocean and, generally speaking, the faster the streamflow, the greater the erosive force. A few natural mechanisms constrain and moderate these erosive forces, such as the slowing of streamflow (and by extension its erosive force) resulting from complex structure both within (*e.g.*, boulders or woody debris) and adjacent (*e.g.*, riparian vegetation) to the stream channel (Knighton 1998). A stream channel will also naturally "meander", eroding laterally to create a sinuous longitudinal course. Stream meandering efficiently regulates the erosive forces by lengthening the channel and reducing stream gradient, thus controlling the ability of the stream to entrain and transport available sediment. Meandering streams also create and maintain both

hydraulic and physical instream habitat used by fish and other aquatic species. For instance, specific to salmon and steelhead, a meandering, unconstrained stream channel sorts and deposits gravel and other substrate necessary for optimal food production and spawning success, maintains a healthy and diverse riparian corridor, and allows floodplain engagement during appropriate winter flows (Spence *et al.* 1996).

By design, streambank stabilization projects prevent lateral channel migration, effectively forcing streams into a straight, linear simplified configuration that, without the ability to move laterally, instead erodes and deepens vertically (Leopold *et al.* 1968, Dunne and Leopold 1978). The resulting "incised" channel fails to create and maintain aquatic and riparian habitat through lateral migration, but instead disconnects flow, natural processes and channel function from adjacent floodplain and riparian habitat, creating a simplified stream reach with poor food production and little functional habitat for summer and winter rearing salmonids (Pollock *et al.* 2007, Florsheim *et al.* 2008).

In the action area, existing bank stabilization has inhibited natural channel function and evolution, preventing creation and maintenance of natural habitat features which can provide complex fish habitat (*e.g.*, undercut banks, submerged rootwads, *etc.*). Although the linear channel length affected by the proposed project is less than 125 feet, by stabilizing the streambank of Miller Creek with rock rip-rap, the Project will continue to maintain the currently compromised conservation value of steelhead habitat in the action area. However, the use of willows and rootwads are expected to benefit habitat through the creation of shade, instream cover, velocity refuge, and stabilization of the streambank.

Excavation of 26 cubic yards creek bed substrate from the north side of the Miller Creek channel could result in the loss of coarse gravel that provides habitat value for spawning and juvenile rearing. Although the substrate includes some sand which reduces its value for spawning, the material to be excavated contributes to habitat and hydraulic complexity in Miller Creek within the action area. Post-excavation, the low flow channel of Miller Creek for a distance of approximately 50 feet is expected will be wider and gradually slope toward the newly installed vegetated rock slope protection. Excavated material from the creek bed will not be entirely lost to the channel because it will be placed along the upper bank above the vegetated rock slope protection. In combination with the Project's placement of three log-rootwads extending partially below the low flow water surface elevation, in-stream channel conditions along the base of the new bank stabilization structure and within the area of excavation are expected to retain habitat value for juvenile steelhead rearing and migration.

2.6 Cumulative Effects

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

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action

area's future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described 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.

CCC steelhead are listed as threatened. Based on the extensive loss of historic habitat due to dams, forestry practices, and urban and agricultural land development, and the degraded condition of remaining spawning and rearing habitats, CCC steelhead have experienced severe declines.

The Project proposes to dewater a relatively small section of Miller Creek (approximately 125 linear feet) and construction is scheduled to occur during the dry season. Therefore, it is anticipated that only rearing juvenile steelhead will be present in the action area during construction and no adult or smolt life stages of steelhead would be affected by Project activities. NMFS estimates up to 15 juvenile CCC steelhead may be present in the reach of creek to be dewatered prior to construction.

As described in the Effects of the Action section above, NMFS identified dewatering and fish relocation as the adverse effects on CCC steelhead that would result from the proposed Project. Prior to dewatering the site for construction, fish would be collected and relocated from the work area. Juvenile steelhead present in the immediate project work area will be subject to capture, relocation, and related short-term effects. Fish that elude capture and remain in the project area during dewatering may die due to desiccation or thermal stress, or be crushed by equipment or foot traffic if not found by biologists during the drawdown of streamflow. Based on the low mortality rates for similar relocation efforts, NMFS anticipates few juvenile steelhead would be injured or killed by fish relocation and construction activities during implementation of this project. Anticipated mortality from relocation is expected to be less than three percent of the fish relocated, and mortality expected from dewatering is expected to be less than one percent of the fish in the area prior to dewatering (combined mortality to not exceed four percent). Because no more than 15 juvenile steelhead are expected to be present, NMFS expects no more than two juvenile steelhead would be injured or killed by all project activities. Due to the relatively large number of juveniles produced by each spawning pair, steelhead spawning in the Miller Creek watershed in future years are likely to produce enough juveniles to replace the few that may be lost at the project site due to relocation and dewatering. Thus, it is unlikely that the small

potential loss of up to two juvenile steelhead during the duration of Project activities will impact future adult returns.

Dewatering of approximately 125 linear feet of creek channel to construct the bank stabilization structure will result in temporary and minor impacts to critical habitat. This 125-foot long reach of stream will be dewatered for two to four weeks during one season. Macroinvertebrate populations subjected to dewatering are expected to recover within one to two months after construction. The design of the bank stabilization structure is anticipated to retain habitat values and functions in the action area as well as increase complex fish habitat through the installation of rootwads. The planting of native vegetation is expected to create shade, produce allochthonous food and shelter, and assist with stabilizing bank sediments.

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 snowfall and rainfall would reduce streamflow levels in Northern and Central Coastal rivers. Estuaries may also experience changes in productivity due to changes in freshwater flows, nutrient cycling, and sediment amounts. For this Project, in-water activities will occur for four weeks in 2019, and the above effects of climate change will not be detected within that time frame. If the effects of climate change are detected over the short term, they will likely materialize as moderate changes to the current climate conditions within the action area. These changes may place further stress on CCC steelhead populations. The effects of the proposed action combined with moderate climate change effects may result in conditions similar to those produced by natural ocean-atmospheric variations as described in the Environmental Baseline section of this opinion (Section 2.4) and annual variations. CCC steelhead are expected to persist throughout these phenomena, as they have in the past, even when concurrently exposed to the effects of similar projects.

2.8 Conclusion

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

2.9 Incidental Take Statement

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

prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take would occur. NMFS anticipates that take of threatened CCC steelhead during construction of the bank stabilization project at 79 and 83 Mount Muir Court in the City of San Rafael, Marin County, California will be associated with fish collection and relocation during stream dewatering.

The number of threatened steelhead that may be incidentally taken during project activities is expected to be small, and limited to the juvenile (pre-smolt) life stage. Take is anticipated to occur during fish relocation and dewatering of the 125-foot long reach of Miller Creek within the action area between September 30 and November 15. The number of juvenile steelhead relocated during project construction is anticipated to be no more than 15 fish, and no more than two juvenile steelhead are expected to be injured or killed during fish relocation and dewatering activities.

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 harm and mortality to listed steelhead resulting from fish relocation and dewatering activities is low.

2. Prepare and submit reports which summarize the effects of construction, fish relocation, and dewatering activities, and post-construction site performance.

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 reasonable and prudent measures (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. Prior to the initiation of construction, the Applicants will provide, through the Corps, a stream dewatering plan and a fish capture and relocation plan to NMFS for review and comment.

   b. Captured fish shall be handled with extreme care and kept in water to the maximum extent possible during relocation activities. All captured fish shall be kept in cool, shaded, aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream, and fish shall not be removed from this water except when released. To avoid predation, the biologist shall 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 habitat condition 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 shall contact NMFS biologist Daniel Logan by phone immediately at (707) 575-6053 or the NMFS North-Central Coast Office at (707) 575-6050. The purpose of the contact is to review the activities resulting in take and to determine if additional protective measures are required. All salmonid mortalities shall be retained, placed in an appropriately-sized sealable plastic bag, labeled with the date and location of collection, fork length measured, and frozen as soon as possible. Frozen samples shall 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 North-Central Coast Office without obtaining prior written approval from the Supervisor of our North-Central Coast Office. Any such transfer will be subject to such conditions as NMFS deems appropriate.

   d. All cofferdams, pumps, pipes and other diversion materials will be removed from the stream upon work completion and no later than November 15.

   e. All pumps used to divert live streamflow will be screened and maintained throughout the construction period to comply with NMFS' Fish Screening Criteria for Anadromous Salmonids. See: www.habitat.noaa.gov/pdf/salmon_passage_facility_design.pdf

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

The Corps or applicant must provide a written report to NMFS by January 31 of the year following construction of the proposed action. The report must be provided to NMFS North-Central Coast Office, Attention: San Francisco Bay Branch Chief, 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, a description of the equipment and methods used to collect, hold, and transport salmonids, 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.

iii. Monitoring of Vegetation and Constructed Items Performance – The Applicants will provide, through the Corps, a plan for monitoring the success of the vegetation within the project site, the performance of constructed elements of the Project, and local geomorphology within the project site to NMFS for review and comment.

2.10 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). NMFS has no conservation recommendations for this Project.

2.11 Reinitiation of Consultation

This concludes the formal consultation for the proposed bank stabilization project on Miller Creek at 79 and 83 Mt. Muir Court in the City of San Rafael, Marin County, California. As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) the amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

3.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion is the U.S. Army Corps of Engineers. Other interested users could include the landowners of the project properties, Geomorph Design, the California Department of Fish and Wildlife, the San Francisco Regional Water Quality Control Board, citizens of San Rafael, California, and others interested in the conservation of threatened steelhead. Individual copies of this opinion were provided to the Corps, the U.S. Fish and Wildlife Service, the California Department of Fish and Wildlife, and the San Francisco Regional Water Quality Control Board. This opinion was provided to the Corps and opinion will be available through the NOAA Institutional Repository (https://repository.library.noaa.gov/), after approximately two weeks. The format and naming adheres to conventional standards for style.

3.2 Integrity

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

3.3 Objectivity

Information Product Category: Natural Resource Plan.

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

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

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

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

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