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

JUL 16 2004

In response refer to:
151422SWR02SR6273:BLS

Lieutenant Colonel Michael McCormick, District Engineer
United States Department of the Army
San Francisco District, Corps of Engineers
333 Market Street, 8th Floor
San Francisco, California 94105-2197

Dear Colonel McCormick:

Enclosed is the National Marine Fisheries Service's (NOAA Fisheries) biological opinion (Enclosure 1) for the United States Army Corps of Engineers' (Corps) proposed permitting of the City of Santa Cruz Public Works Department to perform maintenance and sediment removal within the concrete flood control channel of Branciforte Creek, in the City of Santa Cruz, Santa Cruz County, California (Corps File Number 26875S). This biological opinion concludes the Corps' action is not likely to jeopardize the continued existence of threatened Central California Coast (CCC) Evolutionarily Significant Unit (ESU) steelhead (*Oncorhynchus mykiss*), and is not likely to adversely modify designated critical habitat for threatened CCC ESU coho salmon (*O. kisutch*). NOAA Fisheries expects the action will result in take of CCC ESU steelhead, and, therefore, an incidental take statement is included with the biological opinion. The incidental take statement includes reasonable and prudent measures necessary and appropriate to minimize incidental take of CCC ESU steelhead.

In addition to the biological opinion, NOAA Fisheries has evaluated the proposed project for potential adverse effects to Essential Fish Habitat (EFH) pursuant to section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act. The EFH consultation for Pacific coast salmon (Enclosure 2) has determined that EFH will be only temporarily adversely affected, and in this case EFH recommendations are not necessary.

If you have any questions regarding this consultation, please contact Mr. Bill Stevens of the Santa Rosa Area Office at (707) 575-6066.

Sincerely,

Rodney R. McInnis
Regional Administrator

Enclosures (2)

cc:

Jim Lecky, NOAA Fisheries, Long Beach
Andrew Muss, Corps, San Francisco
Siobhan O'Neill, City of Santa Cruz Public Works Department, Santa Cruz
Robert Floerke, California Department of Fish and Game, Yountville
Diane Noda, U.S. Fish and Wildlife Service, Ventura

Enclosure 1

BIOLOGICAL OPINION

ACTION AGENCY: Department of the Army, Corps of Engineers, San Francisco District

ACTION: Permitting the City of Santa Cruz Public Works Department to Perform Maintenance and Sediment Removal Activities Within the Concrete Flood Control Channel of Branciforte Creek, Santa Cruz County, California.

CONSULTATION CONDUCTED BY: National Marine Fisheries Service, Southwest Region

FILE NUMBER: 151422SWR02SR6273

DATE ISSUED: JUL 16 2004

I. CONSULTATION HISTORY

On May 6, 2002, as requested by the City of Santa Cruz Public Works Department (City), the National Marine Fisheries Service (NOAA Fisheries) provided comments on the City's California Environmental Quality Act Initial Study and Mitigated Negative Declaration for flood control channel maintenance on Branciforte Creek, located in the City of Santa Cruz, Santa Cruz County, California. Branciforte Creek is a tributary to the San Lorenzo River and supports Federally threatened Central California Coast (CCC) Evolutionarily Significant Unit (ESU) steelhead (*Oncorhynchus mykiss*) and is designated critical habitat for threatened CCC ESU coho salmon (*O. kisutch*).

On June 17, 2002, we received the United States Army Corps of Engineers' (Corps) June 13, 2002, request for consultation pursuant to section 7(a)(2) of the Federal Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The consultation would evaluate the effects of the Corps' permitting the City to perform maintenance and sediment removal activities within the concrete flood control channel of Branciforte Creek (Project) on CCC steelhead and designated critical habitat for CCC coho salmon. Through communications with the City and the Corps, NOAA Fisheries requested, and was granted, additional time to respond to the Corps' request.

On February 26, 2003, NOAA Fisheries received the Corps' February 21, 2003, second request for consultation. The Corps determined the proposed project may affect, but was not likely to adversely affect CCC steelhead. NOAA Fisheries did not concur with this determination and on March 25, 2003, informed the City that additional information was necessary to initiate formal

consultation on the Project. On September 23, 2003, NOAA Fisheries received the additional information from the Corps and formal section 7 consultation was initiated. NOAA Fisheries expected to provide the Corps our biological opinion no later than February 5, 2004.

In January 2004, the consultation was delayed due to additional information that became available, conflicts in scheduling site visits, and an expected change in the project description. On February 3, 2004, NOAA Fisheries requested an extension of the consultation period until an updated project description was received. Site visits were conducted on January 15, 2004 (NOAA Fisheries, Corps, California Department of Fish and Game [CDFG], City), and February 12, 2004 (Corps and the City) to clarify the project description.

On May 20, 2004, NOAA Fisheries received an updated project description from the City which was adequate to initiate formal section 7 consultation. NOAA Fisheries confirmed this with the Corps on June 9, 2004.

During consultation, NOAA Fisheries determined coho salmon were not likely to be adversely affected by the proposed project. This biological opinion analyzes the effects of the maintenance and sediment removal activities within the concrete flood control channel of Branciforte Creek on threatened CCC steelhead and designated critical habitat for threatened CCC coho salmon. This biological opinion is based on the best scientific and commercial data available including information contained in the Corps' Project Description, the City's permit application, the City's Negative Declaration for Branciforte Creek Flood Control Channel Maintenance, other letters and electronic mail, field investigations, telephone conversations, and other sources of information. A complete administrative record of this consultation is on file at the NOAA Fisheries Santa Rosa Area Office.

II. DESCRIPTION OF THE PROPOSED ACTION

The Corps proposes to authorize the maintenance and sediment removal activities in Branciforte Creek under the Department of the Army Nationwide Permit 31 (Maintenance of Existing Flood Control Projects) pursuant to section 404 of the Clean Water Act. The City would be permitted to remove accumulated sediment and vegetation in order to maintain the designed footprint and contour of the channel and restore flood capacity. Removal of sediment and vegetation will occur throughout an estimated 3,100 linear feet of Branciforte Creek, between Hubbard Street pedestrian bridge and Ocean Street bridge, in the City of Santa Cruz, Santa Cruz County, California. The City's sediment and vegetation removal activities would be permitted for two years, beginning in the summer of 2004, and continuing through the summer of 2005. Annual project activities will require approximately 21 working days to remove an estimated 5,800 cubic yards of material.

A. Background

Section 6 of the Flood Control Act of 1938 authorized and directed the Secretary of War "to cause preliminary examinations and surveys for flood control including floods aggravated by or due to tidal effect" for several creeks and rivers within the U.S., including the San Lorenzo River. In 1953, a preliminary examination and survey of the San Lorenzo River authorized by the Flood Control Act of 1938 was completed (Corps 1994). As a result of the examination and survey, the recommended plan included "flood-confining levees and floodwalls along the river, together with minor enlargement (dredging) of the channel and removal of certain obstructions to flow, and the improvement of Branciforte Creek by straightening and paving its channel." The "General Design Memorandum, San Lorenzo River Flood Control Project - May 1957" (Corps 1994) provided detailed design of the project authorized by the Flood Control Act of 1954. The basic features of the San Lorenzo River Flood Control Project are composed of a mainstem unit - San Lorenzo River - and a tributary unit - Branciforte Creek (Corps 1994). Construction of the mainstem unit of the San Lorenzo River Flood Control Project was completed in 1959, and the Branciforte Creek flood control channel portion was constructed in 1957-1959.

The Corps has required the City to obtain a separate permit for activities proposed to occur in Branciforte Creek or in the San Lorenzo River. However, the Corps will be writing one operations and maintenance manual (manual) for activities in Branciforte Creek and the San Lorenzo River which will replace the existing manual written in 1962. The Corps plans to complete the manual in 2005 and will request formal consultation pursuant to section 7(a)(2) of the ESA with NOAA Fisheries regarding its implementation. NOAA Fisheries intends that the biological opinion on the Corps' manual will supplement or supercede this existing biological opinion. Furthermore, the City is currently in the discussion stage with the regulatory agencies regarding a Habitat Conservation Plan. It is possible flood control and channel maintenance activities may be included in the list of covered activities.

The Branciforte Creek flood control channel portion of the San Lorenzo River Flood Control Project begins at the confluence with the San Lorenzo River and extends approximately one mile up Branciforte Creek. The flood control channel was designed to convey a 125-year flood event, estimated at 8,400 cubic feet per second (cfs). Accumulated silt, debris, and vegetation have reduced the capacity to 1,800-3,500 cfs, a 58-79% reduction from design capacity. The channel is a fully-lined rectangular concrete channel with 13- to 20-foot high vertical side walls and a 35-foot wide bottom.

A fish passage channel was constructed in the center of the channel to concentrate flow and facilitate passage for fish during low-flow periods. The fish passage channel is trapezoidal with a four-foot top width, one-foot bottom width, and one-foot depth extending from approximately 500 feet above the San Lorenzo River confluence to the upstream end of the flood control channel. The fish passage channel was constructed to accept baffle plates perpendicular to stream flow at 50- and 100-foot intervals. Channel sedimentation has restricted installation of these plates. Based on a site inspection, NOAA Fisheries recommended the City keep the fish

passage channel free of sediment and not install the plates. This recommendation conforms to the Corps' maintenance measure that "[all] sand or other obstructions shall be removed from the fish channel" (Corps 1962).

As part of a maintenance agreement between the Corps and the City (Corps 1962), the City is required to maintain the channel at its design capacity, including keeping the channel free of any obstructions, vegetation, silt or debris that might cause flooding problems during high flows. As such, the City has maintained the flood channel regularly since 1959. However, from approximately 1998 to Spring 2002, the City did not remove sediment and vegetation from the channel because they did not have a California Department of Fish and Game (CDFG) Streambed Alteration Agreement (SAA). Subsequently, debris, silt, and vegetation accumulated in the channel, which: (1) caused some localized flooding, and (2) provided habitat for steelhead. The Corps has sent a letter annually to the City recommending the City to return the channel to its design grade to ensure adequate channel capacity (E. Behn, Corps, pers. comm., December 4, 2003).

As described in the *Consultation History* section above, we received the Corps' initial request for consultation on June 17, 2002. On September 13, 2002, CDFG provided the City with a SAA and the City conducted sediment and vegetation removal activities in the dry portions of the channel above the ordinary highwater mark and without discharging fill into the waters of the U. S. Sediment and vegetation removal activities did not occur in 2003.

B. Project Actions

The City proposes to remove sediment and vegetation during the low-flow period (late summer-early fall) when stream flow is generally confined to the fish passage channel. Sediment and vegetation removal activities within the fish passage channel may be conducted in a different manner than activities within the concrete flood control channel.

1. Maintenance of fish passage channel

In order to remove sediment from the fish passage channel, the City intends to modify a piece of heavy equipment (*e.g.*, small tractor, bulldozer or skidsteer) with a v-shape plow or excavator bucket. The heavy equipment can enter the concrete flood control channel from an existing maintenance road at the upstream end of the flood control channel, or it can be lowered into the channel by a crane located on the maintenance road. The heavy equipment will drive down the center of the fish passage channel with the v-shaped plow pushing the sediment up and out onto the concrete flood control channel and/or use a bucket. Sediment that is removed from the fish passage channel is expected to be flushed from the concrete flood control channel with the onset of winter rains and the subsequent high stream flows. Other types of heavy equipment that may be used in this activity are excavators, draglines, loaders, and dump trucks.

The size of the maintenance area may require that the removal of sediment from the fish passage channel be addressed in sections. For example, depending on the amount of work needed, sediment removal activities would proceed in increments of approximately 50- to 1,000-foot sections. Fish capture and relocation activities and water diversion activities (described below) may be implemented in order to: (1) minimize impacts to CCC steelhead, and (2) facilitate the removal of sediment from the fish passage channel.

The City proposes an "adaptive management" approach in determining how fast sediment fills the fish passage channel following winter flows and what ramifications may occur from sedimentation. The City intends to work closely with the regulatory agencies on what approach is best to ensure the fish passage channel functions as designed. Conditions in the fish passage channel (*e.g.*, amount of sediment present) at the time the maintenance is proposed may dictate the best approach for fish channel maintenance.

2. Maintenance of concrete flood control channel

Two methods of channel cleaning may be used, both of which may require fish capture, and relocation activities and water diversion activities (described below). Both methods are intended to remove sediment in the concrete flood control channel. The accumulation of sediment has diverted flows from the smaller low-flow fish passage channel in the bottom of the flood control channel.

1. A front-end loader will proceed from upstream to downstream. The equipment would proceed down an existing ramp to the dry channel bed and then to the clean-up site. All in-channel equipment will be operated on the dry channel bottom, either to the right or left of the low-flow channel. Elevated wood platforms would be used at locations where equipment must cross the low-flow channel. Debris will be loaded into small dump trucks or containers and transferred to the City landfill. Alternatively, the vegetation will be removed and the silt deposits left in place to be carried out by high stream flows.

2. A small crane or tractor with an arm and bucket will be used to extract sediment and vegetation in the dry channel from various access points on the existing maintenance road above the channel. This method is the City's preferred alternative and would be used at locations where it is not possible to get equipment access to a removal site via the stream channel. Debris will be loaded into small dump trucks or containers and transferred to the City landfill. Alternatively, the vegetation will be removed and the silt deposits left in place to be carried out by high stream flows.

Some of the accumulated sediments and vegetation are located in a reach of the creek that contains the summer lagoon with water backed up from the San Lorenzo River (during most summers, a sandbar forms at the mouth of the San Lorenzo River, closing the mouth and forming a lagoon behind the sandbar. This condition will be described in more detail later in the *Environmental Baseline* section of this biological opinion). These deposits and vegetation would

only be removed when the lagoon is not in place *(i.e.*, when a sandbar did not form at the mouth of the San Lorenzo River) or when the sandbar has been breached.

3. Fish capture and relocation

Fish capture and relocation activities will be conducted as follows: a block net will be placed at the upstream and downstream ends of scheduled work area; the block nets, or other fish exclusion devices, will be kept in place for the duration of sediment and vegetation removal activities, including overnight. A biologist and/or appropriate City staff will walk upstream from the downstream net with a seine. Fish will be captured, placed in a bucket, and released by a biologist upstream of the concrete flood control channel.

If water is present the following morning in the area from where fish were captured, each morning prior to sediment and vegetation removal activities, a visual survey of block-netted area will be conducted. This survey will begin at downstream block net, walking upstream. If any fish are observed, fish will be captured and relocated upstream of the concrete flood control channel. Electrofishing may be used where necessary and appropriate. Genetic material from listed salmonids will be collected, as per NOAA Fisheries request. Upon completion of fish capture and removal activities, water diversion measures will be implemented.

4. Water diversion

The City will divert stream flow around the work area using cofferdams consisting of sandbags, hay bales, clean gravel, rubber, polypropylene or other appropriate material. In some cases, a bypass channel or detention basin may be appropriate to isolate a work area. Piping and pumping may also be used depending on the size (*i.e.*, length) of the work area and the amount of water that needs to be diverted.

Water in the concrete flood-control channel and/or in the fish passage channel will be addressed by the City's "adaptive management" approach. The City intends to work closely with the regulatory agencies on which approach is best to implement dependent upon water depth present at the time maintenance is proposed. As mentioned above, water levels in the action area may be extremely low, or the San Lorenzo River may be backed up all the way up the concrete flood-control channel through the primary maintenance area.

5. Rock diffusers

The Corps' Readiness Branch has suggested the City replace rocks displaced from the invert (*i.e.*, the upstream end) of the concrete flood control channel with new rocks. The rocks are meant to act as diffusers to prevent further erosion and prevent possible damage to the base of the concrete flood control channel. If the City decides to follow this suggestion, the City anticipates this process occurring in the following manner:

Eight granite rocks (five 18-inch and three 30-inch-diameter) will be placed in the natural channel (*i.e.*, immediately upstream of the concrete flood control channel) against the lip or abutment of the concrete flood control channel to protect the concrete. The rocks will not block fish access to the fish passage channel as the rocks will be at the same elevation, or lower than the elevation, of the concrete flood control channel abutment.

The rocks will be pressure washed prior to their installation in order to prevent turbidity. The rocks will be placed in the creek with a crane parked on the maintenance road. The larger rocks will be placed against the abutment and the smaller rocks will be placed directly in front of the larger rocks forming a gradual ramp into the existing fish passage channel. A biologist will be on-site during this activity. The City anticipates this activity would need to re-occur if many of the rocks are displaced as a result of high stream flows, erosion, *etc.* The City typically removes any rocks found in the flood control channel as part of its maintenance activities.

6. Drainage hole maintenance

The concrete flood control channel contains drainage holes which the Corps has determined are outside their jurisdiction as the drainage holes are above the ordinary high water mark. The drainage holes require periodic cleaning and will be accomplished in the following manner:

A vacuum truck will be parked on the maintenance road above the drainage holes and a hose will be lowered into the channel. The hose will connect to the drainage holes which will be vacuumed out. The in-channel areas adjacent to the drainage holes will be sandbagged to prevent any spillage from escaping from the hose into the concrete flood control channel.

C. Minimization and Conservation Measures

The following minimization and conservation measures for CCC steelhead were compiled by NOAA Fisheries from the City's Negative Declaration for Branciforte Creek Flood Control Channel Maintenance and from discussions with the Corps and the City. It is NOAA Fisheries' understanding the following general conditions will be applied to this project by the City to minimize impacts to listed salmonids:

- In-channel activities will be restricted to July 1 through October 31.
- Capture and relocation of fish will be conducted by a qualified fisheries biologist.
- The use of best management practices (*e.g.*, equipment used will not be refueled in or adjacent to the stream channel and all heavy equipment will be operated from the dry channel bed or top of bank) will be implemented to reduce the probability of contaminated material from entering Branciforte Creek.

D. Action Area

The action area is defined by regulation as "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). As such, the action area of this biological opinion includes the immediate area of the project site, beginning with the active concrete channel bed and banks, access roads, and effects downstream. The action area for this project is further defined as the 35-foot wide swath of channel where activities will occur along approximately 3,100 linear feet of flood control channel (108,500 square feet). The action area also includes approximately 200 square feet of the natural channel and bank of Branciforte Creek where rocks will be placed (approximately 20 feet along the bank where the width is approximately 10 feet). The ultimate distance downstream of the project site where effects (*i.e.*, sedimentation and turbidity) may occur cannot be quantified. However, based on sedimentation and turbidity from similar projects in similar streams, NOAA Fisheries expects these effects will be minor, and unlikely to adversely affect steelhead.

III. DESCRIPTION AND STATUS OF THE SPECIES

This biological opinion analyzes the adverse effects of the proposed project on the following species and designated critical habitat:

- Threatened CCC ESU steelhead (62 FR 43937).
- Designated critical habitat for CCC ESU coho salmon (64 FR 24049).

Threatened CCC ESU coho salmon (61 FR 56138) are deemed to be extirpated from the San Lorenzo River watershed at this time. This species, therefore, will not be considered in the effects analysis of this biological opinion.

A. Species Description

Because juvenile steelhead are expected to be rearing in the action area at the time of project activities, life history requirements during this life stage are discussed below in detail.

Spawning by adult steelhead may occur between December and June, but specific timing of spawning may vary a month or more among streams within a region. Shapovalov and Taft (1954) estimated hatching time of steelhead in Waddell Creek, Santa Cruz County, was from 25 to 35 days, emergence from the gravel began two to three weeks after hatching, and another two to three weeks was required to complete emergence. After emergence, steelhead fry utilize habitats with swift currents, moving gradually into deeper water as they grow. Older fry establish territories which they defend.

Juvenile steelhead require living space (different combinations of water depth and velocity), shelter from predators and harsh environmental conditions, food resources, and suitable water quality and quantity, for development and survival during summer and winter (Bjornn and Reiser 1991). Young-of-the-year (0+) and yearling steelhead generally use riffles and runs (*e.g.*, Roper *et al.* 1994) during much of a given year where these habitats exist. However, 0+ and older juveniles may seek cover and cool water in pools during the summer (Nielsen *et al.* 1994). Juvenile steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles.

Streamside vegetation and cover are essential (Bjornn and Reiser 1991). Steelhead juveniles are usually associated with the bottom of the stream. In smaller California streams, the water levels may drop so low during the summer that pools become isolated and are the only viable rearing habitat. Daytime temperatures in summer rearing pools also may be near lethal levels; riparian shading and the presence of sub-surface, cold water seeps are often essential to maintain pool temperatures at tolerable levels. Because rearing juvenile steelhead reside in freshwater all year, adequate flow and temperature are important to the population at all times (CDFG 1997). In winter, juvenile steelhead become inactive and hide in any available cover, including gravel or woody debris.

Juvenile steelhead are affected by water temperature and dissolved oxygen (DO) levels. Water temperatures influence the growth rate, population density, swimming ability, ability to capture and metabolize food, and ability to withstand disease of these rearing juveniles. Dissolved oxygen levels of 6.5 to 7.0 milligrams per liter (mg/L) affected the migration and swimming performance of steelhead juveniles at all temperatures (Davis *et al.* 1963). Low DO levels decrease the rate of metabolism, swimming speed, growth rate, food consumption rate, efficiency of food utilization, affect normal behaviors, and ultimately reduce the survival rate of juveniles.

During rearing, suspended and deposited fine sediments can directly affect salmonids by abrading and clogging gills, and indirectly cause reduced feeding, avoidance reactions, destruction of food supplies, reduced egg and alevin survival, and changed rearing habitat (Reiser and Bjornn 1979). Larger juvenile salmon and trout appear to be little affected by ephemerally high concentrations of suspended sediments that occur during most storms (Cordone and Kelly 1961, Sorenson *et al.* 1977) but juvenile salmonids tend to avoid streams that are chronically turbid, such as those disturbed by human activities (Lloyd *et al.* 1987).

B. ESU Status and Trends

In this opinion, NOAA Fisheries assesses the status of the CCC steelhead ESU by examining four types of information, all of which help to understand a population's ability to survive. These population viability parameters are: abundance, growth rate, spatial structure, and diversity (McElhaney *et al.* 2000). Factors responsible for the current status of the ESU are also described.

While there are no specific estimates of abundance at the population scale, 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 ESU in the mid-1960s, including 50,000 fish in the Russian River[1] and 19,000 fish in the San Lorenzo River (Busby *et al.* 1996). Recent estimates for the Russian River are on the order of 4,000 fish (NOAA Fisheries 1997). Abundance estimates for smaller coastal streams in the ESU indicate low but stable levels (NOAA Fisheries 1997), with recent estimates for several streams (Lagunitas Creek, Waddell Creek, Scott Creek, San Vincente Creek, Soquel Creek, and Aptos Creek) of individual run sizes of 500 fish or less (62 FR 43937).

Overall, the abundance of the CCC steelhead ESU has declined precipitously, from an estimated 94,000 returning adults in the 1960s to estimates less than 5,350 in recent times (Busby *et al.*1996, NOAA Fisheries 1997). These numbers indicate over a 94 percent decline in the population of steelhead spawning in the ESU. Absent information indicating a recent upward trend in numbers ESU wide, NOAA Fisheries assumes that the overall population growth rate may continue to be negative. For more detailed information on the population trend of CCC steelhead, see Busby *et al.* 1996, NOAA Fisheries 1997, and NOAA Fisheries 2003a.

CCC steelhead have maintained a wide distribution throughout the ESU. Presence/absence data show that in a subset of streams sampled in the CCC region, most contain steelhead (NOAA Fisheries 1997). Of streams in the ESU for which there is current presence/absence data on steelhead, 218 of 264 streams currently support some juveniles (including the Russian River). Species with broad distributions are more likely to survive environmental fluctuations and stochastic events, even if they suffer local extirpation (Pimm *et al.* 1988). Many streams in and around the San Francisco Bay region, however, no longer support steelhead.

The interbasin transfer of hatchery steelhead has persisted in various locations and at various times within the CCC ESU (NOAA Fisheries 1997). This has likely affected the genetic composition of existing stocks. Although some genetic research is being done on CCC steelhead, little information is available to assess the diversity of the species.

While CCC steelhead have experienced significant declines in abundance and long-term population trends suggest a negative growth rate, they have maintained a wide distribution throughout the ESU. This suggests that, while there are significant threats to the population, they possess a resilience that is likely to slow their decline. In the recent document titled *Preliminary conclusions regarding the updated status of listed ESUs of West Coast salmon and steelhead*, the biological review team concluded that steelhead in the CCC steelhead ESU remain "likely to become endangered in the foreseeable future" (NOAA Fisheries 2003a).

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[1]The Russian River, which is the largest watershed in the ESU, once boasted steelhead runs ranked as the third largest in California, behind only the Klamath and Sacramento Rivers.

C. Factors Responsible for Stock Declines: Changes to Habitat and Other Impacts

Threats to naturally reproducing steelhead are numerous and varied. Habitat degradation and destruction (CDFG 1998), natural stochastic events (*e.g.*, droughts, landslides, and floods), ocean conditions (Beamish and Bouillion 1993, Beamish *et al.* 1997, Johnson 1988), alteration of stream flows (Chapman and Bjornn 1969, Berggren and Filardo 1993, 61 FR 56138), artificial propagation (Waples 1991, 1999, 61 FR 56138), predation by marine mammals (NOAA Fisheries 1999, Hanson 1993), and reduced marine-derived nutrient transport (Bilby *et al.* 1998, Gresh *et al.* 2000), have played a role to varying degrees in the decline of steelhead populations. Among the most serious and ongoing threats to salmonid survival in this ESU are changes in hydrology, and freshwater habitat degradation and loss. Increases in stream water temperature and other habitat alterations over large areas in the ESU have led to shifts in fish communities favoring warm water species.

In 1997 NOAA Fisheries identified past and present hatchery operations as the major threat to genetic integrity for steelhead in this ESU (NOAA Fisheries 1997a). Hatcheries can cause adverse genetic impacts on wild fish populations, disease transmission, predation on wild fish, replacement rather than supplementation of wild stocks, and depletion of wild stocks to increase brood stocks (61 FR 56138). Four artificial propagation programs are considered part of this ESU (69 FR 33102): (1) Don Clausen Fish Hatchery Captive Broodstock Program in Sonoma County; (2) Scott Creek/Kingfisher Flats Conservation Program in Santa Cruz County; (3) Scott Creek Captive Broodstock Program in Santa Cruz County; and (4) Noyo River Fish Station egg-take Program in Mendocino County, though operations have ceased. These hatchery operations have been improved to address genetic concerns. The stock has not had out-of-basin introductions in recent years, and hatchery fish are excluded from the broodstock. The current program goals of these operations include the restoration of local steelhead stocks.

D. Coho Salmon Critical Habitat

The proposed project occurs in Branciforte Creek, which contains designated critical habitat for threatened CCC ESU coho salmon. The condition of CCC ESU coho salmon critical habitat, specifically its ability to provide for the conservation of coho salmon, has been degraded from conditions known to support viable salmonid populations. NOAA Fisheries has determined 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, water withdrawals, and unscreened diversions for irrigation.

Numerous studies have demonstrated 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. 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, increases in erosion entry to streams from upland areas, loss of shade (resulting in higher water temperatures), and loss of nutrient inputs (64 FR 50394, NOAA Fisheries 1996, 61 FR 56138).

Branciforte Creek is located near the southern boundary of the CCC coho salmon ESU and the southernmost range of coho salmon in the western United States. Coho salmon used Branciforte Creek for spawning and rearing. In 1954-55, the estimated adult coho salmon run in the San Lorenzo River ranged between 7,000 and 14,000 (State Water Resources Control Board 1982). The San Lorenzo River watershed's value as critical habitat is high for coho salmon, given its location near the southernmost extent of their range and the relatively large coho population it supported historically. Recovering coho salmon to the full extent of their former range will likely require restoring important components of critical habitat in Branciforte Creek, such as spawning and rearing areas.

E. Status of the Species in the San Lorenzo River and Branciforte Creek

1. Overview

The San Lorenzo River is the primary municipal water source of the greater Santa Cruz area with approximately 85,000 customers (60-80 percent of the City's supply; County of Santa Cruz 2000). Approximately 75,000 people live within the watershed and obtain water supply from smaller streams and groundwater basins within the watershed (County of Santa Cruz 2000). The San Lorenzo River watershed is currently subject to numerous deleterious impacts including water diversions, summer dams, timber harvest, and urbanization. Unless current water supplies are augmented, the City of Santa Cruz will be unable to meet average annual demands in normal rainfall years, and the City of Santa Cruz Water Department recognizes that existing water supplies are inadequate to meet the health and safety needs of its current users in drought conditions (Swanson Hydrology & Geomorphology *et al.* 2002).

Watersheds within the San Lorenzo River are sinuous and incised with many ridges and deep ravines. Slow downward soil movement and landslides are the natural erosional processes chiefly responsible for forming the topography of this area. Numerous faults cross the San Lorenzo Valley and pose a potential geologic hazard and contribute overall to sediment loading in the Santa Cruz Mountains (Balance Hydrologics, Inc. 1998).

2. Steelhead in the San Lorenzo River and Branciforte Creek

Recent data for the San Lorenzo River watershed suggest this basin has a steelhead population smaller than 15 percent of the size it had 30 years previously. This basin was thought to have originally contained one of the two largest steelhead populations in the ESU (NOAA Fisheries 2003a).

Available information suggests that steelhead numbers in Branciforte Creek have declined similarly to the overall ESU and San Lorenzo River declines (Titus *et al.* 2002, CDFG 1996), although specific information on historic population levels within the creek are not available. Titus *et al.* (2002) and CDFG (1996) documented declines in instream habitat values in Branciforte Creek due to a variety of anthropogenic-induced factors. Recent information on juvenile abundance (post-1955) does exist for Branciforte Creek (Titus *et al.* 2002, Alley 2000, 2001, 2002, H.T. Harvey & Associates 2003). However, some information is qualitative, making it difficult to quantify the rate of recent decline in steelhead populations at the watershed level (*i.e.*, San Lorenzo River steelhead population) and local level (*i.e.*, Branciforte Creek's local steelhead population).

Since 1994, the County of Santa Cruz, the City of Santa Cruz, and the San Lorenzo Valley Water District have collaboratively funded surveys in the San Lorenzo River and its tributaries to ascertain population levels of steelhead. These surveys have been more rigorous than past efforts and provide the best available estimate of year-to-year status of steelhead in the San Lorenzo River watershed. Since 1998, two sites in Branciforte Creek have been sampled, and juvenile steelhead abundances have been estimated (Alley 2000, 2001, 2002, H.T. Harvey & Associates 2003). Estimated reach densities of total juvenile steelhead density in Branciforte Creek (1998-2002) from the nearest sample site to the action area - approximately 2.5 miles upstream - ranged from 29.0 to 68.0 juvenile steelhead per 100 feet.

In 2002, estimated juvenile steelhead abundance extrapolated to the mainstem of the San Lorenzo River and all sampled tributaries was 168,278, the highest since 1998, which had similar abundance estimates (H.T. Harvey & Associates 2003). Annual estimates of total juvenile steelhead produced in Branciforte Creek (Alley 2000, 2001, 2002, H.T. Harvey & Associates 2003) ranged from 10,682 in 2002 to 16,621 in 1998.

Branciforte Creek above the concrete flood control channel contains 10.5 miles of salmonid spawning and rearing habitat, and an additional 8 miles of habitat are available in three major tributaries to Branciforte Creek (CDFG, unpublished data, 2002). Vegetation, primarily willows (*Salix* spp.), in the concrete flood-control channel had not been removed between approximately 1998 and Spring 2002 and provided habitat for juvenile steelhead, as at least 100 juveniles were observed by NOAA Fisheries in the lower reach. Vegetation was removed in late summer/early fall 2002 and subsequent field visits comprised of ocular estimations conducted by NOAA Fisheries resulted in no steelhead observations. Three sites totaling 1,132 feet within the concrete flood-control channel were sampled for steelhead on August 19, 2003. Four juvenile steelhead (two pre-smolts) were captured at one site while zero steelhead were captured at the other two sites (Hagar Environmental Science 2003).

3. Anthropogenic Factors Affecting Species in Branciforte Creek

A variety of factors, both anthropogenic and natural, have played a role in the decline of steelhead in Branciforte Creek. Natural events, such as floods, droughts, and ocean productivity

cycles, have depressed population numbers when these events occur. However, the more recent anthropogenic destruction and degradation of essential freshwater habitats have reduced the resiliency of steelhead in Branciforte Creek to natural disturbances.

Excessive erosion, sedimentation, and turbidity (SCCPD 1979), diminished streamflows (SCCPD 1979, NOAA Fisheries 2001a, Denise Duffy & Associates, Inc. 1999) and channelization (Mount 1995) and summer dams (NOAA Fisheries 2001b) have degraded steelhead spawning and rearing habitats and designated critical habitat for CCC coho salmon in the San Lorenzo River watershed. These effects caused by on-going activities such as urbanization and water diversions, are expected to continue to occur in Branciforte Creek and the San Lorenzo River.

IV. ENVIRONMENTAL BASELINE

1. Aquatic Habitat Conditions in the Action Area

Branciforte Creek is a tributary to the San Lorenzo River which discharges to Monterey Bay at the City of Santa Cruz. A portion of Branciforte Creek has been channelized for flood control. The flood control channel was built through the existing Branciforte Creek valley from the confluence with the San Lorenzo River to 5,200 feet upstream. The flood control channel receives runoff from Carbonera Creek and the mainstem of Branciforte Creek which have a combined drainage area of 17.2 square miles. The confluence of Carbonera and Branciforte Creeks is approximately 0.25 miles upstream from the upper end of the flood-control reach.

The 5,200-foot flood-control channel is trapezoidal (mostly rectangular) in shape, lined with concrete. The width of the flood-control channel is 35 feet, and the wall varies in height from 13 to 20 feet. Habitat within the concrete flood-control channel consists of the low-flow channel and riffles, runs, glides, and corner scour pools that occur within the sediment deposits that lay on top of the concrete bottom (Gilchrist 2002). The concrete channel, when kept cleared of vegetation and sediment, provides little-to-no rearing habitat for salmonids due to high flow velocities, lack of instream cover, and high summer temperatures (CDFG 2002), though rearing juvenile and steelhead smolts were observed in August 2003 (Hagar Environmental Science 2003). NOAA Fisheries does not expect salmonids use the concrete channel for spawning due to the limitations described, and lack of spawning gravels. This area is primarily used as a migratory corridor to the salmonid spawning and rearing habitat upstream in Branciforte Creek and its tributaries. On August 19, 2003, flow was estimated at 1.5 cfs and velocity was approximately 1 foot per second (Hagar Environmental Science 2003).

From the upstream end of the concrete flood control channel downstream to approximately the Water Street Bridge (approximately 1,900 feet), the gradient is relatively high and generally very little sediment accumulates. Downstream from the Water Street Bridge the gradient decreases. Vegetation within the channel consists of yellow willow (*Salix lasiandra*), arroyo willow (*S.*

lasiolepis), white alder (*Alnus rhombifolis)*, acacia (*Acacia decurrens*), cattail (*Typha domingensis*), French broom (*Genista monspessulanus*), and Kikuyu grass. In many parts of the channel, silt, debris, and vegetation in the fish passage channel have pushed the creek out of the fish passage channel toward the east or west bank wall.

Vegetation above the top of the concrete flood control channel consists largely of ornamental trees and shrubs planted on private property (*i.e.*, in residences' backyards). Species above Water Street include redwood (*Sequoia sempervirens*), acacia, pines (*Pinus* spp.), *Eucalyptus* spp., and other ornamentals. On the east bank below Water Street native trees such as California bay (*Umbelluaria californica*), buckeye (*Aesculus californica*), and coast live oak (*Quercus agrifolia*) are interspersed with non-native blackwood and green wattle acacia. Some of the trees and large shrubs above the concrete flood control channel are overhanging, providing some shade to stream flows during summer months.

The lower portion of the San Lorenzo River is comprised of an estuarine reach. During winter months, the sandbar at the mouth of the San Lorenzo River is open and the river is subject to tidal exchange. In the summer months, the combined effect of declining river flows and the creation of a sandbar by summer wave action can result in sandbar closure. During a closed-bar condition at the mouth, the San Lorenzo River backs up through the action area. Within the action area, this situation produces deep, slack water habitat. Under an open-bar condition, stream flow is typically confined to the fish passage channel. Rapid changes between conditions as a result of a closed-bar or open-bar results in a high frequency of disturbance in the action area with very little response time for steelhead to react to the new hydrologic regime.

2. Status of Steelhead in the Action Area

Steelhead are present within the concrete flood-control channel. Adults and juveniles use the action area as a migration corridor and juveniles may use the action area as rearing habitat when suitable conditions exist (*i.e.*, when debris, silt, and vegetation accumulate in the channel). Three sites totaling 1,132 feet within the concrete flood-control channel were sampled for steelhead on August 19, 2003. Four juvenile steelhead - including two smolts - were captured at one site while zero steelhead were captured at the other two sites (Hagar Environmental Science 2003). Adult steelhead are not expected to be present when the project is scheduled to occur based on the shallow depths at the project site and the timing of adult migration (winter/spring). NOAA Fisheries estimates juvenile steelhead density in the concrete flood-control channel averages approximately 1 steelhead per 283 feet of stream (four juvenile steelhead per 1,132 feet of stream divided by four). NOAA Fisheries estimates that no more than 11 juvenile steelhead (3,100-foot action area divided by 283 feet of stream) are likely to be present in the action area when project activities occur.

3. Previous formal consultations in Branciforte Creek

a. Widening of Branciforte and Carbonera Creek Bridges on U.S. Route 1

On November 14, 2001, NOAA Fisheries issued our biological opinion to the Federal Highway Administration on this project (NOAA Fisheries 2001a). Adverse effects to listed species were limited to the immediate footprint of the project area and temporary impacts from construction activities were localized at the project sites. Most project related impacts were expected to be of limited scope and duration, and were expected to have no long term effects on the survival of the listed species, either within the Branciforte and Carbonera Creek drainages, the San Lorenzo River watershed, or at the ESU level. Long-term construction impacts were expected to be limited to the actual footprint of the work pads, the widened bridges due to Emeline Street off ramp structures, revegetated areas, low flow channel, and areas where stream bank integrity was expected to be enhanced. The areas of the channels disturbed for the instream work were expected to revert to a more natural condition than existed due to incorporation of boulder enhanced low flow channel and removal of sac concrete slope protection. This project has not yet occurred.

b. Market Street Bridge Scour Repair Project

On September 4, 2003, NOAA Fisheries issued our biological opinion to the Corps on this project (NOAA Fisheries 2003b). Impacts from the scour repair were expected to be localized at the project site, of limited scope and duration, and were expected to have no long-term effects on the survival of the listed species within the Branciforte Creek drainage, the San Lorenzo River watershed, or at the ESU level. The area of the channel disturbed for the instream work was expected to revert to a more natural condition than existed due to the scour repair and removal of obsolete concrete chunks. Based on post-project information provided to NOAA Fisheries, this project was completed as proposed, and impacts to listed species and aquatic habitats were as anticipated.

V. EFFECTS OF THE ACTION

The purpose of this section is to identify the direct and indirect effects of the proposed action on threatened CCC steelhead in the action area and designated critical habitat for threatened CCC coho salmon. Generally, the effects of the proposed action on steelhead and aquatic habitat, including designated coho salmon critical habitat, are those associated with performing maintenance of the flood-control channel, including removing sediment and vegetation from the channel.

A. Sediment Removal

Increased sedimentation and turbidity could result if fine sediment is contributed to Branciforte Creek, or mobilized, during the proposed action. Substantial sedimentation rates could bury less mobile organisms (Ellis 1936, Cordone and Kelley 1961) that serve as a food source for many fish species, degrade instream habitat conditions (Cordone and Kelly 1961, Eaglin and Hubert 1993), and cause reductions in fish abundance (Alexander and Hansen 1986, Berkman and Rabeni 1987) and growth (Crouse *et al.* 1991). Turbidity may cause indirect harm, injury or mortality to juvenile steelhead in the action area. High turbidity concentrations can result in fish mortality, reduce feeding efficiency, and decrease food availability (Berg and Northcote 1985, McLeay *et al.* 1983, Gregory and Northcote 1993, Velagic 1995).

The proposed sediment and vegetation removal activities will affect the physical and biological environment of the action area. Cofferdams will be used to temporarily divert flows in Branciforte Creek and dewater the work areas. Dewatering activities will affect approximately 3,100 linear feet of Branciforte Creek. The stream flow diversion structures will be in place for a maximum duration of four months (July 1 through October 31), though likely will only require 21 days. These temporary structures in the stream may hinder movement of steelhead between areas upstream and downstream of the work areas. However, the cofferdams will be placed such that stream flow will go around the dewatered area and will allow for juvenile steelhead to pass.

The operation of the cofferdams and water diversions are not expected to adversely affect steelhead movements in Branciforte Creek because few steelhead are likely to be moving through the concrete channel during the work period (July 1 through October 31). The work period is outside the migratory period of both adult and juvenile steelhead. Adult steelhead migrate upstream during the winter months and post-spawned adults will return downstream immediately following spawning in the late winter and early spring. Adult steelhead are not expected to be present in the action area during the proposed work period and not expected to be directly affected by sediment and vegetation removal activities. The movements of a few juvenile steelhead may be affected temporarily, but because stream flow and passage around the cofferdams will be provided, this temporary impact is unlikely to affect the fitness of individual fish.

Most steelhead smolts outmigrate between February and April, though two smolts were captured in the action area in August 2003 (Hagar Environmental Science 2003). During the work period, few juvenile steelhead are expected to be in the concrete channel due to poor habitat conditions. Steelhead spawning in Branciforte Creek occurs upstream of the concrete channel, as does higher quality summer rearing habitat.

Any effects as a result of an increase in turbidity and/or sedimentation are not likely to adversely steelhead or their habitat in the action area, as these effects are expected to be minimal and temporary. The City proposes to isolate the work areas from flowing water and the in-channel work window will be limited. Steelhead will be relocated upstream prior to channel maintenance

activities. Sediment that is mobilized will be flushed downstream following the first rainfall event.

B. Riparian Vegetation Removal

The removal of vegetation within the concrete flood control channel - primarily willows and cattails - could result in increased stream temperatures. Riparian vegetation moderates stream temperatures by providing canopy which shades the water and reduces the amount of insolation (*i.e.*, direct solar radiation) that reaches the water surface (Beschta 1991, Hetrick *et al.* 1998). Listed species may be harmed when stream temperatures are elevated to such an extent that they result in behavioral and/or physiological responses, which in turn, result in decreases to the individual's ability to survive.

Stream side vegetation provides habitat for terrestrial insects, which are important food for salmonids. This vegetation also directly provides organic material to the stream, which makes up about 50 percent of the stream's nutrient energy supply for the food chain (Cummins 1974). Detritus from incoming terrestrial plants is a principal source of food for aquatic invertebrates that eventually become food for fish (Minshall 1967). Removal of stream side vegetation can, therefore, affect the diet of fish by reducing production of both terrestrial and aquatic insects (Chapman and Demory 1963).

The removal of vegetation within the concrete flood control channel will reduce the amount of cover available for steelhead. The importance of cover to fish is well documented. For instance, when stream cover is reduced, a decline in salmonid abundance is often a consequence (Boussu 1954).

Riparian vegetation removal may result in increased stream temperatures, reduce the amount of available food, and decrease the quality of habitat. However, few juvenile steelhead use the action area as rearing habitat and likely do so only because vegetation and sediment were allowed to accumulate because channel maintenance activities did not occur. Steelhead habitat was degraded with the creation of the concrete channel in 1959 and implementation of channel maintenance activities will result in little-to-no habitat for steelhead.

Adults use the action area as a migratory corridor, and NOAA Fisheries does not expect the quality of adult steelhead migration habitat will be reduced as a result of sediment and vegetation removal activities.

C. Fish Capture and Relocation

Juvenile steelhead within the project site will be captured following the installation of the containment barrier and relocated to adjacent suitable habitat upstream of the concrete flood control channel. As described previously in the *Environmental Baseline* section, NOAA Fisheries does not expect more than 11 steelhead will need to be captured and relocated.

An effect of principal concern is mortality and injury to juvenile steelhead in the work area due to fish capture and relocation activities. Any fish relocation gear, whether passive (Hubert 1983) or active (Hayes 1983) has some associated risk to the fish, including stress, disease transmission, injury, or death.

Dip nets and/or seines will be used to capture and relocate juvenile steelhead. Small steelhead can be gilled in the mesh of a seine and scales and dermal mucus can be abraded by contacting the net. Juvenile steelhead can be suffocated if they are not quickly removed from the net after the net is removed from the water to process steelhead. Steelhead also can be crushed by the handler if the handler steps on the net. The risks to juvenile steelhead can be minimized if the handler carefully, quickly, and thoroughly removes all steelhead from the net and places them in bucket of water.

Electrofishing may be used where necessary and appropriate. Electrofishing can kill both juvenile and adult fish (Reynolds 1983, Zeigenfuss 1995, Habera *et al.* 1996, Nordwall 1999). The amount of unintentional mortality attributable to electroshocking may vary widely depending on the equipment used, the settings on the equipment, ambient conditions, and the expertise and experience of the personnel. The effects to fish from electroshocking can be severe and may include death, spinal injuries, burns, hemorrhaging, and physiological stress. Long-term effects of electroshocking on both juveniles and adult salmonids are not well understood. Though chronic effects may occur, it is assumed most impacts from electroshocking occur at time of sampling.

After juvenile steelhead are relocated, stress from crowding and increased competition for food in the relocation areas may occur. This stress and increased competition in the relocation areas will be minimal and temporary. Upon project completion, steelhead will be able to redistribute in the action area unimpeded.

Based on NOAA Fisheries' prior experience with current relocation techniques and protocols to be used to conduct the fish capture and relocation activities, unintentional mortality of listed juvenile CCC steelhead expected from capture and handling procedures is not likely to exceed three percent of the fish subjected to handling, and can be reduced to near one percent with increased skill and experience of the fish relocation personnel. Despite these impacts, fish capture and relocation operations are expected to significantly minimize project impacts to steelhead by removing them from areas where they would have experienced high rates of injury and mortality. Based on the estimate of salmonid numbers given above, and a three percent mortality rate from dip netting and/or seining, NOAA Fisheries expects that at most one steelhead will be killed during fish capture and relocation activities.

D. Dewatering

Stream flow diversion and work space dewatering is expected to cause temporary loss, alteration, and reduction of aquatic habitat within the action area. Stream flow diversions could harm

individual steelhead by concentrating or stranding them in residual wetted areas (Cushman 1985) before they are relocated, or causing them to move to adjacent habitats (Clothier 1953, 1954, Kraft 1972, Campbell and Scott 1984). Steelhead could be killed or injured if crushed beneath the containment barrier during installation, though direct mortality is expected to be minimal because of the small number of steelhead in the action area. During installation of the containment barrier, a fisheries biologist will remain in the flood control channel to net and rescue any additional fish that may have become stranded throughout the dewatering process.

It is unlikely that steelhead which initially avoid capture in work spaces will die during dewatering activities. Due to the concrete bottom of the flood control channel and lack of escape cover, any steelhead that initially avoid capture will be easily observed near the completion of the dewatering process, captured, and relocated. NOAA Fisheries does not expect any steelhead will be killed as a result of stranding during dewatering activities.

Benthic (*i.e.*, bottom-dwelling) aquatic macroinvertebrates may be temporarily lost or their abundance reduced when individual organisms are stranded or when creek habitats are dewatered (Cushman 1985). Effects to aquatic macroinvertebrates resulting from stream flow diversions and dewatering will be temporary because construction activities will be relatively short-lived, and rapid recolonization (about one to two months) of disturbed areas by macroinvertebrates (Cushman 1985, Thomas 1985, Harvey 1986) is expected following rewatering. In addition, the effect of macroinvertebrate loss on juvenile steelhead is likely to be negligible because food from upstream sources (via drift) would be available downstream of the dewatered areas since stream flows will be maintained outside of the checkdam. Based on the foregoing, the loss of aquatic macroinvertebrates as a result of dewatering activities is not expected to adversely effect steelhead.

E. Interrelated and Interdependent Actions

An interrelated action is an activity that is part of a larger action and depends on the larger action for its justification. An interdependent action is an activity that has no independent utility apart from the action under consultation (50 CFR §402.02). There are no known interrelated or interdependent actions associated with the Corps permitting maintenance and sediment removal activities within the concrete flood control channel of Branciforte Creek.

VI. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. In addition to the on-going activities described above in the *Environmental Baseline* section, the City of Santa Cruz is proceeding with an ocean desalination project as their current water system relies primarily on

surface water supplies. When properly located and planned accordingly, ocean desalination can be an environmentally safe alternative that avoids or minimizes impacts to Federally listed salmonids. Limiting the use of surface water as a source of water supply is important for the recovery of listed species. An expected benefit of a regional desalination project would be using desalinated seawater to replace water withdrawals from coastal streams.

VII. INTEGRATION AND SYNTHESIS OF EFFECTS

Channel maintenance activities in Branciforte Creek Flood Control Channel will result in the dewatering of 3,100 linear feet of Branciforte Creek. Steelhead present in the areas to be dewatered will be subject to capture and relocation. One steelhead may be killed as a result of fish capture and relocation activities.

Impacts from the channel maintenance activities will be localized at the project site, will be of limited scope and duration, and are expected to have no long-term effects on the survival of the listed species within the Branciforte Creek drainage, the San Lorenzo River watershed, or at the ESU level.

Although the population of steelhead in Branciforte Creek is considerably depressed from historical numbers, NOAA Fisheries does not believe the loss of a few juvenile steelhead will appreciably reduce the number, distribution, or reproduction of steelhead in Branciforte Creek. Maintaining the concrete flood control free of sediment and vegetation is expected to preclude many juvenile steelhead from rearing in the action area, which has generally been the case between 1959 and 1998.

As described in the *Status of the Species in the San Lorenzo River and Branciforte Creek* section of this biological opinion, data suggests the San Lorenzo River watershed basin has a steelhead population smaller than 15 percent of the size it had 30 years previously, and steelhead numbers in Branciforte Creek have declined similar to the overall ESU and San Lorenzo River declines. NOAA Fisheries believes it is reasonable to conclude that steelhead densities in Branciforte Creek where the channel is now lined with concrete were higher before the flood control channel was constructed. Some steelhead habitat is created in the concrete flood control channel when channel maintenance activities do not occur. Thus, the steelhead carrying capacity of Branciforte Creek was reduced with the creation of the concrete flood control channel and remains reduced with on-going channel maintenance activities.

NOAA Fisheries does not expect that sustaining the reduced carrying capacity of the habitat in the action area due to channel maintenance activities will appreciably reduce the likelihood of steelhead survival and recovery in Branciforte Creek, the San Lorenzo River, or the ESU. Branciforte Creek above the concrete flood control channel contains 10.5 miles of salmonid spawning and rearing habitat, and an additional 8 miles of habitat are available in three major tributaries to Branciforte Creek (CDFG, unpublished data, 2002). Steelhead spawning in

Branciforte Creek occurs upstream of the concrete channel, as does higher quality summer rearing habitat. As described earlier, the downstream end of the concrete flood control begins at the confluence with the San Lorenzo River. In 2002, estimated juvenile steelhead abundance extrapolated to the mainstem of the San Lorenzo River and all sampled tributaries was 168,278, the highest since 1998, which had similar abundance estimates (H.T. Harvey & Associates 2003). There are no known projects expected to occur in Branciforte Creek similar to the construction of a 5,200-foot concrete-lined channel. Further, the City of Santa Cruz is in the discussion stage with the regulatory agencies regarding a Habitat Conservation Plan. Thus, Branciforte Creek is unlikely to experience habitat modification in the future similar to what occurred with the construction of the Branciforte Creek Flood Control Channel.

Keeping sediment free from the fish passage channel will improve juvenile passage through the concrete flood control channel to rearing habitat upstream and downstream of the concrete flood control channel. Based on the approximate 10,000 to 16,000 juvenile steelhead in Branciforte Creek, a one-time loss of one juvenile steelhead rearing in the action area during channel maintenance activities is unlikely to have a detectable effect on this population's abundance or viability because the remaining population is large enough to be resilient to this small, one-time, loss. Spawning in subsequent years is expected to produce enough juveniles to repopulate any habitat area that may become vacant by the loss of one juvenile, though less habitat will be available as a result of channel maintenance activities. Thus, survival and recovery of this population, or the ESU in general, is not likely to be appreciably reduced.

The effects of the project will result in temporary impacts to critical coho salmon habitat, as well as the longer term impacts discussed above. Increased sedimentation and turbidity, stream flow diversion, and resultant loss of aquatic macroinvertebrates are short-term effects. These impacts are expected to last no more than a few weeks based on the impact minimization measures and conservation measures proposed. The sustained reduction in carrying capacity is unlikely to reduce the value of CCC coho salmon critical habitat in Branciforte Creek because the value of any habitat that forms in the concrete flood control channel via the accumulation of sediment and vegetation is limited, and much larger areas of higher value habitat exist in the Creek and San Lorenzo River watershed.

VIII. CONCLUSION

After reviewing the best available scientific and commercial information, the status of CCC steelhead, the environmental baseline for the action area including the condition of CCC coho salmon critical habitat, the effects of the proposed maintenance and sediment removal activities within the concrete flood control channel of Branciforte Creek, and cumulative effects, it is NOAA Fisheries' biological opinion that the proposed project is not likely to jeopardize the continued existence of CCC steelhead, nor is it likely to destroy or adversely modify designated coho salmon critical habitat.

IX. 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 NOAA Fisheries 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 NOAA Fisheries as specified in the incidental take statement (50 CFR §402.14(I)(3)).

This incidental take statement is based on implementation of the proposed project as described in the *Description of the Proposed Action* section of this biological opinion, including impact minimization and conservation measures incorporated into the project design. Failure to implement the project as proposed (including relevant conservation measures) or implementation of the project in a manner that causes an effect to listed species, or designated critical habitat not considered in this opinion may cause coverage of section 7(o)(2) to lapse and require reinitiation of consultation to ensure compliance with section 7(a)(2) of the ESA.

A. Amount or Extent of Take

Based on estimated juvenile steelhead densities in the action area, NOAA Fisheries anticipates incidental take of CCC steelhead is likely to occur as a result of implementation of the proposed project. During dewatering and fish relocation activities, all juvenile steelhead present will be subjected to capture and related stresses. With direct relocation mortality rates (*i.e.*, as a result of electrofishing) ranging up to three percent and the unlikely potential for many steelhead to be left in dewatered areas since the action area has a concrete bottom, NOAA Fisheries expects one steelhead will be killed during relocation and dewatering activities. The area directly disturbed by flood control channel maintenance activities will be approximately 108,500 square feet. All juveniles present in that area between July 1 and October 31 will captured. No incidental take of

adult steelhead is anticipated for this project.

B. Effect of the Take

In the accompanying biological opinion, NOAA Fisheries determined this level of anticipated take is not likely to result in jeopardy to CCC steelhead and the project is not likely to result in the destruction nor adverse modification of CCC coho salmon critical habitat.

C. Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize take of threatened CCC steelhead. The results of the effect analysis in this biological opinion provide the basis for the reasonable and prudent measures.

1. The Corps shall implement measures to reduce and monitor steelhead injury and mortality associated with dewatering and fish relocation activities.

2. The Corps shall implement minimization and conservation measures that will avoid and minimize impacts to CCC steelhead.

3. The Corps shall report to NOAA Fisheries activities associated with minimizing and monitoring effects of the proposed action on steelhead.

D. Terms and Conditions

In order to be exempt from the take prohibitions of the ESA, the Corps must comply with the following non-discretionary Terms and Conditions, which implement the Reasonable and Prudent Measures described above.

The following Terms and Conditions implement Reasonable and Prudent Measure No. 1.

1. Captured fish shall be kept in cool, shaded, aerated water (*e.g.*, plastic bucket) protected from noise or jostling any time they are not in the stream and fish shall not be removed from this water except for (1) collection of genetic material (see below) and (2) when released.

2. Fish capture activities shall be conducted by a NOAA Fisheries-approved biologist. Contact NOAA Fisheries (see below) for approval procedures.

3. If electrofishing is used to capture fish, the backpack electrofisher will be set as follows:

	Initial settings	Maximum settings
Voltage	100 V (Volts)	400 V
Pulse width	500 µs (microseconds)	5 ms (milliseconds)
Pulse rate	30 Hz (Hertz)	70 Hz

4. No electrofishing shall occur if water conductivity is greater than 350 µS/cm (microSiemens per centimeter) when instream water temperatures exceed 18°C. Only direct current (DC) shall be used.

5. A minimum of three passes with the electrofisher will be utilized to ensure maximum capture probability of steelhead within the area proposed for dewatering.

6. All captured steelhead will be processed and released prior to conducting a subsequent electrofishing pass.

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

8. Fish shall not be overcrowded into buckets, allowing approximately six cubic inches per 0+ individual and more for larger/older fish.

9. Make every effort not to mix 0+ with potential predators that may consume the smaller salmonids.

10. A copy of this biological opinion shall be kept on-site for the duration of the project.

The following Term and Condition implements Reasonable and Prudent Measure No. 2.

1. Fish screens on pumps shall be implemented according to NOAA Fisheries' *Fish Screening Criteria for Anadromous Salmonids* (NOAA Fisheries 1997b).

2. In order to prevent rocks placed within the natural channel of Branciforte Creek (immediately upstream of the concrete flood control channel) becoming displaced and causing fish passage impediments in the fish passage channel, rocks placed shall be sized appropriately to minimize the likelihood of becoming displaced.

The following Terms and Conditions implement Reasonable and Prudent Measure No. 3.

1. Notify NOAA Fisheries one week prior to capture activities in order to provide an

opportunity to attend. Call NOAA Fisheries Biologist Bill Stevens at (707) 575-6066, or e-mail at William.Stevens@noaa.gov.

2. Provide a written monitoring report to NOAA Fisheries within 90 working days following the completion of the proposed action. The report shall include the number of CCC steelhead killed or injured during the proposed action; the number and size (in millimeters) of steelhead captured and removed; any effect of the proposed action on steelhead not previously considered; and photographs taken before, during, and after the activity from photo reference points. All data relating to steelhead shall be submitted to the Santa Rosa NOAA Fisheries Office at 777 Sonoma Avenue, Room 325, Santa Rosa, California, 95404-6528, Attention: Bill Stevens.

3. If more than two listed salmonids are killed, injured, or found dead or injured, the project permitee shall contact NOAA Fisheries Biologist Bill Stevens by phone immediately at (707) 575-6066. If Mr. Stevens cannot be reached, the Santa Rosa NOAA Fisheries Office will be contacted at Federal Relay 1-866-377-8642 ([707] 578-8555). The purpose of the contact is to review the activities resulting in take and to determine if additional protective measures are required. All steelhead mortalities must be retained, placed in an appropriately sized whirl-pak or zip-lock bag, labeled with the date and time of collection, fork length, location of capture, and frozen as soon as possible. Frozen samples must be retained until specific instructions are provided by NOAA Fisheries.

4. For all steelhead (if any) captured for relocation, genetic tissue data will be collected. The following information shall be part of the Genetic Tissue Collection Data:

Collection Date
Collection Location (County, River, Exact location on river)
Collector Name
Collector Affiliation/Phone
Sample ID Number
Species Tissue Type
Condition
Fork Length (mm; in order to facilitate measurements, fish may be anesthetized.)
Sex (M, F, Unk.)
Adipose Fin Clip? (Y or N)
Tag? (Y or N)
Notes/Comments

If the City collects genetic tissue, it shall be collected according to the following protocols:

a. Live fish: Cut a three millimeter (mm) square clip from tail fin using clean scissors and place sample in a piece of dry blotter/filter paper (e.g., Whatman brand). Return steelhead to aerated bucket to recover. Fold blotter paper over for temporary storage. Samples must be air-dried as soon as possible (do not wait more than eight hours). Air-drying inside takes about 24 hours; air-drying in the sun is much quicker. When blotter/filter paper is dry to the touch, place it and sample into a clean envelope labeled with Sample ID Number. Seal envelope.

b. Live fish (alternate method): Cut a three mm square clip from tail fin using clean scissors and store the clip in a small (e.g., two milliliter) vial filled with pure ethanol. Return steelhead to aerated bucket to recover. Sample must be fully immersed in ethanol. Ethanol dissolves all inks, so make sure vials are well sealed and outside is dry. Label with Sample ID Number.

c. Carcasses: Either a three mm square clip from the operculum or tail fin, or alternately, complete scales (20-30) should be removed and placed on a piece of dry blotter/filter paper (e.g., Whatman brand). Fold blotter paper over for temporary storage. Samples must be air-dried as soon as possible (do not wait more than eight hours). When tissue/paper is dry to the touch, place into a clean envelope labeled with Sample ID Number. Seal envelope.

d. Additional guidelines:

Never cut adipose fin.
Each sample must be stored in a separate tube or envelope.
Each sample must be clearly labeled with the Sample ID Number.
Samples may be sent surface mail.
Samples are for scientific research. Please take care in their collection.

5. The Genetic Tissue Collection Data shall be provided to the Salmonid Genetic Repository, NOAA Fisheries Science Center, 110 Shaffer Road, Santa Cruz, California, 95060. Please contact Dr. Carlos Garza at (831) 420-3903 with questions or for additional instructions.

X. CONSERVATION RECOMMENDATIONS

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

1. NOAA Fisheries recommends the Corps develop plans to address the impacts of summer dams in the San Lorenzo River watershed on salmonids.

2. NOAA Fisheries recommends the Corps work with the City of Santa Cruz, other agencies, and stakeholders to develop and implement a program for protection and restoration of salmon and steelhead habitat in the San Lorenzo River watershed.

3. NOAA Fisheries recommends the Corps work with the City of Santa Cruz to develop a City-wide plan on how to minimize impacts to riparian habitats on projects permitted by the Corps.

In order for NOAA Fisheries to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, NOAA Fisheries requests notification of the implementation of any conservation recommendations.

XI. REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the project proposal. 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 in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; (4) a new species is listed or critical habitat designated that may be affected by the action; or (5) the measures outlined above and included in the project proposal are not fully implemented. In instances where the amount or extent of incidental take is exceeded, formal consultation shall be reinitiated immediately.

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Enclosure 2

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

Maintenance and Sediment Removal Activities Within the Concrete Flood Control Channel of Branciforte Creek, Santa Cruz County, California.

I. INTRODUCTION

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established requirements for Essential Fish Habitat (EFH) descriptions in Federal fishery management plans and to require Federal agencies to consult with the National Marine Fisheries Service (NOAA Fisheries) on activities that may adversely affect EFH. EFH for Pacific Coast salmon has been described in Appendix A, Amendment 14 to the Pacific Coast Salmon Fishery Management Plan. As described below in the *Proposed Action* section of this EFH consultation, the proposed activities of the City of Santa Cruz Public Works Department (City) permitted by the U.S. Army Corps of Engineers (Corps) affect Branciforte Creek, which has been designated EFH for salmon.

Only species managed under a Federal fishery management plan are covered under the MSFCMA. Coho salmon and Chinook salmon are managed under Federal fishery management plans, whereas steelhead are not managed. Therefore, these EFH Conservation Recommendations address only coho salmon and do not address steelhead. No recommendations are presented for Chinook salmon EFH because Chinook salmon are not present and do not use Branciforte Creek.

II. LIFE HISTORY AND HABITAT REQUIREMENTS

The life history of coho salmon in California has been well documented by Shapovalov and Taft (1954) and Hassler (1987). In contrast to the life history patterns of other anadromous salmonids, coho salmon in California generally exhibit a relatively simple 3-year life cycle (Shapovalov and Taft 1954, Hassler 1987). Adult salmon typically begin the freshwater migration from the ocean to their natal streams after heavy late-fall or winter rains breach the sand bars at the mouths of coastal streams (Sandercock 1991). Delays in river entry of over a month are not unusual (Salo and Bayliff 1958, Eames et al. 1981). Migration continues to March, generally peaking in December and January, with spawning occurring shortly after returning to the spawning grounds (Shapovalov and Taft 1954).

Coho salmon are typically associated with small to moderately-sized coastal streams characterized by heavily forested watersheds; perennially-flowing reaches of cool, high-quality

water; dense riparian canopy; deep pools with abundant overhead cover; instream cover consisting of large, stable woody debris and undercut banks; and gravel or cobble substrates.

Female coho salmon choose spawning sites usually near the head of a riffle, just below a pool, where water changes from a laminar to a turbulent flow and there is small to medium gravel substrate. The flow characteristics of the location of the redd usually ensure good aeration of eggs and embryos, and flushing of waste products. The water circulation in these areas also facilitates fry emergence from the gravel. Preferred spawning grounds have nearby overhead and submerged cover for holding adults; water depth of 10-54 centimeters (cm); water velocities of 20-80 cubic meters per second (cm/s); clean, loosely compacted gravel (1.3-12.7 cm diameter) with less than 20 percent fine silt or sand content; cool water (4-10 degrees Celsius [°C]) with high dissolved oxygen (8 milligrams per liter [mg/l]); and an intergravel flow sufficient to aerate the eggs. The lack of suitable gravel often limits successful spawning in many streams.

Each female builds a series of redds (nests), moving upstream as she does so, and deposits a few hundred eggs in each. Fecundity of coho salmon is directly proportional to female size; coho salmon may produce deposit from 1,000-7,600 eggs (reviewed in Sandercock 1991). Briggs (1953) noted a dominant male accompanies a female during spawning, but one or more subordinate males also may engage in spawning. Coho salmon may spawn in more than one redd and with more than one partner (Sandercock 1991). Coho salmon are semelparous (they spawn once and then die). The female may guard a nest for up to two weeks (Briggs 1953).

The eggs generally hatch between four to eight weeks, depending on water temperature. Survival and development rates depend on temperature and dissolved oxygen levels within the redd. According to Baker and Reynolds (1986), under optimum conditions, mortality during this period can be as low as 10 percent; under adverse conditions of high scouring flows or heavy siltation, mortality may be close to 100 percent. McMahon (1983) found that egg and fry survival drops sharply when fines make up 15 percent or more of the substrate. The newly-hatched fry remain in the gravel from two to seven weeks until emergence from the gravels (Shapovalov and Taft 1954). Upon emergence, fry seek out shallow water, usually along stream margins. As they grow, they often occupy habitat at the heads of pools, which generally provide an optimum mix of high food availability and good cover with low swimming cost (Nielsen 1992). Chapman and Bjornn (1969) determined that larger parr tend to occupy the head of pools, with smaller parr found further down the pools. As the fish continue to grow, they move into deeper water and expand their territories until, by July and August, they are in the deep pools. Juvenile coho salmon prefer well shaded pools at least 1 meter deep with dense overhead cover; abundant submerged cover composed of undercut banks, logs, roots, and other woody debris; preferred water temperatures of 12-15°C (Brett 1952, Reiser and Bjornn 1979), but not exceeding 22-25°C (Brungs and Jones 1977) for extended time periods; dissolved oxygen levels of 4-9 mg/l; and water velocities of 9-24 cm/s in pools and 31-46 cm/s in riffles. Water temperatures for good survival and growth of juvenile coho salmon range from 10-15°C (Bell 1973, McMahon 1983). Growth is slowed considerably at 18°C and ceases at 20°C (Stein *et al.* 1972, Bell 1973).

Preferred rearing habitat has little or no turbidity and high sustained invertebrate forage production. Juvenile coho salmon feed primarily on drifting terrestrial insects, much of which are produced in the riparian canopy, and on aquatic invertebrates growing in the interstices of the substrate and in the leaf litter in the pools. As water temperatures decrease in the fall and winter months, fish stop or reduce feeding due to lack of food or in response to the colder water, and growth rates slow down. During December-February, winter rains result in increased stream flows and by March, following peak flows, fish again feed heavily on insects and crustaceans and grow rapidly.

In the spring, as yearlings, juvenile coho salmon undergo a physiological process, or smoltification, which prepares them for living in the marine environment. They begin to migrate downstream to the ocean during late March and early April, and out migration usually peaks in mid-May, if conditions are favorable. Emigration timing is correlated with peak upwelling currents along the coast. Entry into the ocean at this time facilitates more growth and, therefore, greater marine survival (Holtby *et al.* 1990). At this point, the smolts are about 10-13 cm in length. After entering the ocean, the immature salmon initially remain in nearshore waters close to their parent stream. They gradually move northward, staying over the continental shelf (Brown *et al.* 1994). Although they can range widely in the north Pacific, movements of coho salmon from California are poorly known.

III. PROPOSED ACTION

The Corps proposes to authorize the maintenance and sediment removal activities in Branciforte Creek under the Department of the Army Nationwide Permit 31 (Maintenance of Existing Flood Control Projects) pursuant to section 404 of the Clean Water Act. The City would be permitted to remove accumulated sediment and vegetation in order to maintain the designed footprint and contour of the channel, and restore flood capacity. Removal of sediment and vegetation will occur throughout an estimated 3,100 linear feet of Branciforte Creek, between Hubbard Street pedestrian bridge and Ocean Street bridge, in the City of Santa Cruz, Santa Cruz County, California. The City's sediment and vegetation removal activities would be permitted for two years, beginning in the summer of 2004, and continue in 2005. Annual project activities will require approximately 21 working days to remove an estimated 5,800 cubic yards of material.

IV. EFFECTS OF THE PROJECT ACTION

Effects of the proposed project on salmon EFH are those associated with the maintenance and sediment removal activities in the concrete flood control channel in Branciforte Creek as described in the preceding biological opinion. In the action area in Branciforte Creek (approximately 108,500 square feet), EFH is temporarily adversely affected by this project due to sedimentation, turbidity, and loss of macroinvertebrates from project activities.

V. CONCLUSION

After reviewing the effects of the maintenance and sediment removal activities in Branciforte Creek, NOAA Fisheries believes the project action, as proposed, will adversely affect the EFH of coho salmon in Branciforte Creek. However, these adverse effects will be minor and temporary. NOAA Fisheries has determined that coho salmon have been extirpated from Branciforte Creek and will not be impacted by adverse effects from this project. Therefore, no EFH recommendations are provided.

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