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

August 21, 2020 **Refer to NMFS No:** WCRO-2020-00478

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

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the County of San Mateo, Regional General Permit

Dear Mr. Mazza:

Thank you for your letter dated February 28, 2020, 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 County of San Mateo (County), Regional General Permit (RGP). This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402, 84 FR 45016).

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

The enclosed programmatic biological opinion is based on our review of the proposed RGP and describes NMFS' analysis of potential effects on endangered Central California Coast (CCC) coho salmon (*Oncorhynchus kisutch*), threatened Central California Coast (CCC) steelhead trout (*O. mykiss*), and threatened North American green sturgeon southern DPS (*Acipenser medirostris*) and designated critical habitat for these species in accordance with section 7 of the ESA. In the enclosed programmatic biological opinion, NMFS concludes the RGP is not likely to jeopardize the continued existence of these species; nor is it likely to adversely modify critical habitat. However, NMFS anticipates that take of CCC coho salmon and CCC steelhead trout may occur. An incidental take statement which applies to this project with non-discretionary terms and conditions is included with the enclosed biological opinion.

NMFS has reviewed the proposed project for potential effects on EFH and determined that the proposed project would adversely affect EFH for Pacific Coast Salmon, which are managed under the Pacific Coast Salmon Fishery Management Plan. While the proposed action contains measures to minimize, mitigate, or otherwise offset the adverse effects to EFH, an additional EFH Conservation Recommendation is included in this opinion. Please be advised that regulations (50 CFR 600.092) to implement the EFH provisions of the MSA require your office

to provide a written response to this letter within 30 days of its receipt and prior to the final action. A preliminary response is acceptable if a final response cannot be completed within 30 days. Your final response must include a description of how the EFH Conservation Recommendation will be implemented and any other measures that will be required to avoid, mitigate, or offset adverse impacts of the activity. If your response is inconsistent without EFH Conservation Recommendation, you must provide an explanation for not implementing this recommendation at least 10 days prior to final approval of the action.

Regarding the threatened North American green sturgeon southern DPS, NMFS concurs with the Corps' determination that the Project is not likely to adversely affect this species. However, NMFS did not concur with the Corps' may adversely affect determination regarding North American green sturgeon southern DPS critical habitat and found that the Project is not likely to adversely affect their designated critical habitat.

Please contact Yvette Redler-Medina, (831) 460-7564 or via email at yvette.redler-medina@noaa.gov, if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

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Copy to ARN File 151422WCR2019SR00117

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the County of San Mateo, Regional General Permit

NMFS Consultation Number: WCRO-2020-00478
Action Agency: U.S. Army Corps of Engineers

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 (CCC) coho salmon ESU (*Oncorhynchus kisutch)*	Endangered	Yes	No	Yes	No
Central California Coast (CCC) steelhead DPS (*O. mykiss*	Threatened	Yes	No	Yes	No
North American green sturgeon southern DPS (*Acipenser medirostris*)	Threatened	No*	No	No*	No

*Please refer to section 2.12 for the analysis of species or critical habitat that are not likely to be adversely affected.

Table 2. Essential Fish Habitat and NMFS' Determinations:

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

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

Issued By:

Alecia Van Atta
Assistant Regional Administrator
West Coast Region

Date: August 21, 2020

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1. INTRODUCTION

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

1.1 Background

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

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

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

1.2 Consultation History

Early coordination between NMFS, the U.S. Army Corps of Engineers (Corps), the County of San Mateo Department of Public Works (DPW), and Parks Department (Parks) (hereafter collectively known as "County") has been ongoing since September of 2018. On June 3, 2019, NMFS received an initiation package from the Corps requesting formal consultation for a Regional General Permit (RGP) in the County. The Corps determined that proposed activities in the RGP are likely to adversely affect Central California Coast (CCC) steelhead trout Distinct Population Segment (DPS), Central California Coast (CCC) coho salmon Evolutionary Significant Unit (ESU) and critical habitat for these species. The Corps determined that the proposed activities were not likely to adversely affect North American green sturgeon (sturgeon) Southern DPS, but may adversely affect their critical habitat. Additionally, the following EFH are likely to be adversely affected by proposed activities in the RGP: Pacific Coast Salmon, Coastal Pelagic Species and Pacific Coast Groundfish.

NMFS reviewed the consultation package which included the San Mateo Maintenance NMFS Biological Assessment (BA) (H.T. Harvey & Associates, May 2019) and the County of San Mateo Routine Maintenance Manual (Manual) (Horizon, 2019). NMFS requested additional information on the project description by letter to the Corps and the County on August 29, 2019. The County response was received on September 17, 2019 and a meeting was scheduled to discuss the San Mateo County Routine Maintenance Program (Program) on October 16, 2019. The October 16, 2019 meeting attendees included NMFS, the County and their consultants. Items discussed at the meeting included: suggested language revisions on the Program scope; predetermined limits on Program activities; and identification of actions that may necessitate mitigation. NMFS was notified that the final County Manual would be

forthcoming and NMFS would have an opportunity to review and comment before beginning formal initiation.

On December 5, 2019, NMFS requested by email, listed species monitoring data known to the County to help determine baseline population estimates. On December 20, 2019, the County provided some information regarding previous consultations, surveys and fish relocation efforts to NMFS via email. NMFS closed the consultation on January 15, 2020 due to non-receipt of updated County Manual or BA as per consultation timelines.

NMFS received a request to reinitiate the consultation from the Corps by letter on March 3, 2020. Included in the consultation package was the revised and updated BA (H.T. Harvey & Associates, Feb 2020) and Manual (Horizon, Feb 2020). NMFS requested additional information on March 13, 2020 by email and received an email response from the County on March 19, 2020. NMFS requested further clarification on proposed action by email on April 7, 2020 and the County responded by email on April 7, 2020. NMFS initiated consultation on April 7, 2020. Communication continued during consultation to clarify or define the proposed action through emails and a phone call between NMFS and the County and their consultants on 7/16/20. The County submitted new language to the project description regarding spacing between bank stabilization projects and large woody debris management on July 23, 2020. On August 5, 2020, by phone call between NMFS, the Corps, and the County, details to be included in the notification process were reviewed and accepted. NMFS also notified the Corps and the County about Reasonable and Prudent Measures as well as associated Terms and Conditions and EFH Conservation Recommendations to be included in the Program.

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 a RGP for the County to conduct routine maintenance activities to ensure County facilities are properly functioning and operational in accordance with the County Manual dated February 2020 (Horizon 2020). The Manual contains several Best Management Practices (BMPs) and Avoidance and Minimization Measures (AMMs) that will be implemented into the Program. The proposed Program would cover activities throughout San Mateo County (Program Maintenance Area) for a duration of five years (2020-2025) under the authority of Section 404 of the Clean Water Act (CWA) of 1972, as amended, (33 U.S. Code [USC] Section 1344) and Section 10 of the Rivers and Harbors Act (RHA) of 1899, as amended, (33 USC Section 403), in accordance with provisions of "Regulatory Programs of the Corps of Engineers," 33 CFR Section 323.2(h) for activities that are substantially similar in nature and cause only minimal individual and cumulative environmental impacts. Each proposed action will be submitted in an annual work plan to NMFS and the Corps for review and approval to ensure they fall under the provisions of the Program. The annual work plan will be approved by NMFS and Corps prior to the onset of the annual work window (June 15 to October 15). The Program will be valid for 5-years from the date the Corps issues the permit to the County and pending County compliance the permit may be eligible for renewal.

Under this Program, the routine maintenance includes the following categories of activities: maintenance and repairs at culverts, storm drainage facilities, channels and bridges; maintenance of roadside ditches and swales, green infrastructure (GI), and low impact development (LID) stormwater

facilities; sediment and debris removal from flood control channels and other facilities; bank stabilization along creeks, including slip-out repairs; vegetation management along County-maintained roads, trails and other facilities; road and trail maintenance, including non-native vegetation removal; non-dredging maintenance activities at Coyote Point Marina and other shoreline maintenance activities such as concrete and seawall revetment repair and sewer line/ejector tank cleaning. Descriptions on these activities are provided below.

This maintenance Program does not include emergency or unplanned maintenance or repair work (with the exception of slide repairs); projects that would alter the designed flood conveyance capacity of an existing engineered channel; large construction project exceeding set thresholds; capital improvement projects; or annual work plan projects not approved by NMFS and the Corps. The proposed Program would only authorize those activities that are subject to Corps authorities identified above. The Corps recognizes that certain activities in the manual that do not have any federal nexus may affect NMFS-managed species; in these cases, the County would be solely responsible for complying with the Endangered Species Act.

To ensure that individual and cumulative impacts to waters of the United States are no more than minimal, the Program would specify work length and size limits for specific maintenance activities. Maintenance activities would only occur when clearly defined thresholds and limits have been met as described in chapter 9 of the Manual. BMPs would be followed when a covered maintenance activity is triggered. The impact minimization strategy is further described in Section 1.3.2 below as well as Section 3.5 of the BA. A complete list of BMPs are included in Appendix A of this biological opinion (BO).

1.3.1 Description of Covered Activities

The specific activities required to complete the proposed actions (projects) will depend on the timing, magnitude, and location of the projects. There are two physiographic regions in San Mateo County where maintenance activities will occur, the Coastside that drains into the Pacific Ocean and the Bayside that drains into South San Francisco Bay (Figure 1). Specific project details (*e.g.,* design plans and locations) for most projects that would be covered under this Program are currently unknown; however, the scope of activities for each category of covered activity are known and are described below. Additionally, Appendix B of the BA includes maintenance undertaken by the County within recent years or sites that will likely require maintenance within the next five to ten years. Many of the maintenance activities located within the Program Maintenance Area do not involve sensitive habitat for listed salmonids. However, several locations that may need maintenance within the timeframe of this permit occur on salmonid bearing streams. It is anticipated that approximately 15 sites could involve dewatering and permanent loss of habitat and/or potential take of listed salmonids. Additionally, there are 30 general locations where maintenance activities will occur on or near salmonid streams or the bay. AMMs on these sites will likely avoid the loss of permanent habitat or the need for dewatering and/or potential take of federally ESA-listed salmonids. General location sites are listed within each maintenance category below.

1.3.1.1 Project and Program Limits

The following section outlines limitations for Program activities developed in collaboration with NMFS, the Corps, and the County of San Mateo. This Program is designed to ensure County facilities are properly functioning and operational. Any project that exceeds the specified limitations will not be covered under this 5-year Program, and therefore, must undergo separate consultations under Section 7 of the ESA. The project activities are guided by criteria set forth in the County Manual to determine if repair or replacement is warranted under the Program. Once it is determined that maintenance, repair or replacement is warranted, there are several bank or channel activities that include project and Program limits which are listed in Table 3.

Table 3. Program limits for Bank or Channel Activities

Activity	Project limit	Yearly limit	Program limit
Bank Stabilization			
average hydrologic year[1]	May not exceed 150 linear feet; and 3000 square feet (SF)	750 feet Max work area: 15,000 SF	3,750 feet 75,000 SF
wet hydrologic[1] *year*	May not exceed 150 linear feet; and 3000 SF	1,500 feet Max work area: 15,000 SF	
Culvert Repair and Replacement			
salmonid bearing streams	100 feet per site 60 inch diameter or less Max work area: 500 SF	one per year (100 feet)	five total projects (500 feet)
non-salmonid bearing streams[2]	150 feet per site 60 inch diameter or less Max work area 750 SF	1,500 feet per year	7,500 feet per year
Sediment Removal			
sediment in channels	Not to exceed 500 linear feet in channels; with max work area of 3,750 SF	1,500 linear feet 1,500 cubic yards	7,500 feet 7,500 cubic yards
sediment at crossings	Not to exceed 150 linear feet at crossings or culverts; max work area of 1,125 SF		
Dewatering			
limits	May not exceed 750 feet	May not exceed 2,500 feet	May not exceed 12,500 feet

[1] Hydrologic year determination will be guided by the Western Regional Climate Center (WRCC) on whether the rainfall that year met the definition of an "average" or "wet" hydrologic year.

[2] The County defines non-salmonid bearing streams as those that do not have the habitat required to successfully bear salmonids, in breeding or other critical life stage cycles, and often have downstream structural impediments that would prevent salmonids from gaining access to the particular reach or maintenance location.

In addition to these near-water related activities, several other Program limitations are described in the project descriptions below.

Work Windows: the activities covered under this Program may be conducted year round except those activities involving listed species and bodies of water. For those activities, the work will be done in the dry season beginning June 15 and ending October 15. Any deviation from this work window may only occur on a case-by-case basis pending prior review and approval from NMFS.

1.3.1.2 Culvert, Storm Drainage, Channel and Bridge Maintenance

1.3.1.2.1 Culvert Repair and Replacement

Culvert failure or deterioration typically reduces hydraulic capacity due to flow obstruction and blockage and may lead to increased erosion downstream of the culvert. At road or trail crossings where either inadequately sized or poorly designed culverts exist, a large storm event could damage or overwhelm the facility and cause scouring beneath the roadway and culvert itself. Culvert failures and deterioration have been indicated as a contributing factor to the sedimentation issues in Coastside channels. This includes Pescadero-Butano and San Gregorio watersheds, which are listed as impaired for sediment in the Clean Water Act Section 303(d) list.

For a typical culvert replacement, existing pipe (CMP, RCP, or HDPE) is replaced with HDPE or CMP pipe sized for adequate capacity. Generally, culverts are typically sized to convey the 100-year design flow per agency and County requirements. Culvert replacement typically entails trenching, removing the existing culvert, replacing it, backfilling the trench and compacting the soil or fill material, and repaving if the culvert is at a road crossing. Depending on the site, this activity may also involve slip-lining, stabilizing the area beneath a culvert, or installing flumes or other energy dissipaters at culvert outlets. Recently, the County utilized a new trenchless solution referred to as centrifugally cast concrete, which utilizes a spincaster to apply thin coats of cementitious material to the inside of failing culverts. This method creates a new waterproof pipe that adheres to the original pipe and is proven to be successful in extending the life of existing pipes without the need for trenching and excavation activities typically required for traditional culvert replacement work. The slope and gradient of replacement culverts that are discharging to a ditch, creek, or channel are aligned with the receiving watercourse to maintain stream course continuity and to avoid washout or erosion of the streambed, stream banks, and/or other earthen material. In addition, the County strives to install culverts at or below grade, as site conditions allow. However, along some of the steeper coastal roads, this is not always feasible. Typically, surface disturbance is limited to less than five linear feet from the culvert inlet and outlet. Depending on where the culvert replacement takes place, equipment is generally operated from the roadway, roadway shoulders, or trail. To the extent possible, staging of equipment and materials also occurs within the roadway right-of-way above and outside of active channels. Culvert replacement that impedes fish passage or does not meet NMFS approval for fish passage design in salmonid streams will not be covered under this Program.

Repair of an existing culvert consists of replacing a segment of detached pipe, applying a layer of concrete to the invert of the culvert where most of deterioration occurs, installing a liner inside the existing pipe, or adding a flume at the end of a pipe, or other erosion protection treatment, such as rock dissipators, to prevent or reduce erosion at the culvert outfall. Culvert repair work may also involve

repair of deteriorated headwalls at the inlet or outlet side of culverts. Repair work typically occurs when the site is dry and when rain is not forecasted within the next 72 hours.

The Program would perform routine repair and replacement of standard culverts generally 60 inches or less in diameter within the Maintenance Program Area. Typically, each culvert repair or replacement site would be between 25 to 60 feet in length. Culvert repair and replacement work activities on non-salmonid bearing streams would be limited to 150 linear feet per site. Culvert repair and replacement activities on salmonid-bearing streams are limited to 100 feet per site (Table 3). Degraded CMP culverts that require replacement currently exist along Pigeon Point Road and Alpine Road on the Coastside of the county. Potential candidates for repair or replacement on salmonid bearing streams also include culverts on Alpine Creek, San Pedro Creek, Slate Creek and San Mateo Creek. Additionally, there are potential culvert repair or replacement candidates in Memorial County Park, Pescadero Creek County Park, San Pedro Valley Park, Crystal Springs Fitzgerald Marine Reserve and Coyote Point Recreation Area.

1.3.1.2.2 Clearing of Debris and Sediment Removal from Storm Drainage Facilities

The Program will clear clogged culverts, inlets, culvert outfalls, flap gates, diversion structures, storm drains, manholes, catch basins, and other storm drainage facilities in the Program Maintenance Area. As a routine maintenance activity, County culverts and storm drains are typically cleaned during the fall. Other trash capture devices on storm drains are inspected and cleaned routinely throughout the year.

If clearing debris from culverts cannot be accomplished by hand, Vac-Con trucks are used. These are vehicles equipped with a vacuum system that uses hoses to extract material without excavation. Pump stations are also checked routinely, including both dry season and wet season inspections, to confirm they are in operational condition. Repairs and maintenance are conducted as necessary, including removal of trash and debris at pump station wells using pool nets and potentially the Vac-Con. In addition, where fallen trees and large woody debris have accumulated at culvert inlets or outfalls, the Program will remove the trees and woody debris. For projects requiring removal of large wood due to infrastructure safety or flooding concerns, the County, when feasible, will salvage useable wood (i.e., rootwads, large diameter conifers) for reuse in future LWD and habitat improvement projects. This type of work is typically conducted on an as-needed basis within the Program Maintenance Area.

1.3.1.2.3 Sediment Removal

To alleviate increased flood risks associated with sediment accumulation, the County may remove excess sediment from channels and road crossing structures (*e.g.,* bridges and culverts) and other facilities within the Program Maintenance Area. The three channel types defined in the County are engineered channels, non-engineered modified channels and natural channels. Engineered channels are channels that are designed and built to provide a particular conveyance capacity (*e.g.,* flood control channels, concrete box culverts). Engineered channels typically have reconstructed banks that may be made out of engineered compacted fill or other hardened materials such as concrete or rock. Non-engineered modified channels (as compared to natural channels/creeks, etc.) are channels that have been historically altered or modified (for example, realigned when a road was built or widened), but are not engineered to convey a specific design flow. Sediment removal occurs in engineered channels non-engineered modified channels and natural creeks and is limited to the as-built channel design.

Sediment removal activities typically occur at focused localized sites that experience sediment deposition or blockages. For this Maintenance Program, sediment removal activities are limited to localized sites that are 500 feet in length or less. The program is limited to removal of no more than 500 cubic yards of sediment from a channel site. However, the amount of sediment removed from a site is typically less than 100 cubic yards. If mechanized sediment removal is necessary, the County may use an excavator or backhoe from the top of bank or road. Work generally occurs under dry channel conditions. However, if maintenance is necessary where water is in the channel, dewatering would be conducted through use of cofferdams or a clean water bypass. Removed sediment may be off-hauled to another County facility and stored for future use for local projects. Removed sediment from urban watersheds is tested prior to removal and disposed of at an appropriate facility. Examples of facilities needing sediment removal activities include San Bruno Creek at Walnut Street Crossing and Belmont Creek at Old County Road. Two sites on salmonid bearing creeks include Pescadero Creek Road at Butano Creek and Stage Road at Bradley Creek. See Program limitations above (Table 3).

1.3.1.2.4 Bridge and Channel Maintenance

Bridge maintenance involves conducting erosion protection improvements at the base of bridge abutments, repairing guard railings and the decking on bridges, sealing joints, patching up cracks on the bridge exterior, removing and re-applying paint, conducting general surface and deck treatments, reinforcing steel with galvanic protection, and clearing debris. Maintenance would be conducted in accordance with *Caltrans' Preventative Maintenance Program Guidelines for Local Agencies* dated 2/27/2006. Maintenance of pedestrian bridges typically involves repair or replacement of damaged wood railings, wood surface boards, or repair of abutments. These routine maintenance activities typically occur between June 15 and October 15. If the lower portion of a bridge requires maintenance, dewatering may be required to gain access. Potential sites for County maintenance include salmonid bearing streams of Lobitos Creek, Bear Gulch Creek, Pescadero Creek, Alpine Creek, San Mateo Creek, Mills Creek, Butano Creek, Cordileras Creek, La Honda Creek, and San Gregorio Creek.

Channel maintenance for flood control involves repairing damaged or failed sections of concrete channels, repairing existing channel rock slop protection (RSP), maintaining tide gates, and maintaining levees and floodwalls. Minor damage to concrete channel walls or beds, such as crumbling, cracking, and chipping, are repaired using grout. Larger-scale repair work may require concrete patching or reforming of the channel wall. This work is only conducted when channel flows are at their lowest or completely dry and when rain is not in the 72-hour forecast. In addition, periodic cleaning of weep holes (small holes in concrete channel walls) may be necessary to prevent blockage and allow water to drain.

The placement of RSP along creek banks reduces the potential for erosion to occur. Where RSP is already present, the County conducts in-kind repairs by replacing the missing or damaged rocks. This work is conducted to ensure RSP is operating as intended and to prevent or minimize bank erosion.

Program activities include maintaining a tide gate at the outlet of the lower reach of San Bruno Creek. If not properly maintained, debris blockages at the tide gate can result in backwatering effects and flooding upstream. The County removes accumulated debris and trash at the tide gate to reduce the risk of flooding. The flaps on tide gates are also replaced on an as-needed basis. Tide gates require periodic repainting for corrosion protection and replacement.

Sheetpile floodwalls along County maintained channels are visually inspected on a quarterly basis. If observed damage threatens the integrity of the structure, minor repairs are conducted to return the floodwalls to the as-built design. Such work typically entails graffiti removal, removal of some vegetation to allow visual inspection of the floodwall, removal of rust, addition of protective coatings, replacement of rubber gaskets or seals at access gates, and other periodic repairs to prevent or correct erosion near the floodwalls. Levees along flood control channels require maintenance to ensure the structural integrity of the structures. Levees that potentially require maintenance under the Program include earthen engineered sections of the Colma Creek flood control channel (from Utah Avenue to the mouth of the creek in South San Francisco) and a section of San Francisquito Creek (between Highway 101 upstream to Euclid Avenue in East Palo Alto). Levee maintenance activities involve filling in burrow holes for rodent control, replacing fallen rocks, repairing cracks, and repairing slip-outs along the face to prevent erosion. Open burrows are filled with earth material and compacted for a smooth finish with the surrounding levee surface. Other activities include replacement of fallen rocks, repairing cracks, and repairing slip-outs along the face to prevent erosion. Slip-out repairs are conducted using similar methods as outlined in Section 3.4.4 Road and Trail Maintenance of the BA (H.T. Harvey & Associates, Feb 2020).

1.3.1.2.5 Roadside Ditch, Swale and Green Infrastructure Maintenance

Ditches and swales are maintained to reduce roadway flooding by providing runoff carrying capacity; preventing erosion and scouring of the ditch and adjacent roadway/shoulder and slopes; and reducing the delivery of pollutants to stormwater and the watershed downstream. Where roadside ditches have eroded below the existing grade, maintenance staff typically regrade these areas with gravel rock and/or soil to match the previous ditch surface. Ditches may also be retrofitted with low impact development (LID) enhancements such as ditch widening, slope reduction, incorporation of weirs to promote infiltration and residence time, addition of native vegetation and grasses to reduce velocities and to promote filtration, and addition of biofiltration soils.

Green infrastructure (GI) roadside swales and bioretention areas require periodic maintenance to maintain infiltration capacity beneath the GI feature. Maintenance activities that occur at GI sites include trash removal, storm drain inlet and outlet cleaning, weed removal, light sediment clearing, and replanting of vegetation on an as-needed basis.

1.3.1.3 Creek Bank Stabilization

Creek bank stabilization involves the repair and stabilization of eroded or eroding banks. Bank stabilization activities take place on an as-needed basis, based on the risk for flooding, erosion, or bank failure. Under this Program, the County has anticipated the need to perform more bank stabilization repairs during or after a wet hydrological year (Table 3). The total work distance along streambanks is typically 25-100 feet. For the purposes of this Program, the total work distance will not exceed 150 feet per site. This work would typically occur between June 15 and October 15 when channels are at their driest. Prior to initiating bank stabilization repair work, the County's civil engineer will inspect the creek banks. In addressing an eroded or destabilized streambank, the County strives to use earthen and biotechnical bank stabilization solutions to minimize adverse environmental effects. If a bank repair is necessary, the County will consider site-specific conditions to develop the most appropriate treatment that provides stability and minimizes long-term environmental impacts. To guide the bank treatment

design, the County will: (1) assess the type of bank failure that occurred (sheered slope, undercut bank, rotational slump, culvert failure, etc.); (2) evaluate how the type of bank failure that occurred was related to site-specific conditions; (3) evaluate hydraulic conditions (bank height, bank slope, water surface elevations, shear stress, etc.); (4) evaluate bank materials (soil type, strength, saturation conditions, etc.); (5) assess geomorphic conditions (instream features, location related to channel bend, confluence, confined banks, etc.); and (6) assess property and land use conditions adjacent to the repair site (including easement width, access, and any other constraints that may limit a sustainable stable design). Based on this site-specific assessment of forcing factors and site constraints, an appropriate bank treatment plan will be developed, with preference given to biotechnical treatment solutions.

Biotechnical treatments the County may use include brush layering; brush packing; live staking; use of native materials like large woody debris to anchor a streambank; soil and grass covered revetments; or log, rootwad, and biorevetments. If biotechnical approaches are determined unsuitable (*e.g.,* steep slope, limited right of way width), the County may consider hardscape engineered solutions (*e.g.,* riprap, concrete, shot-crete, solider pile retaining walls, slope soil nailing) based on site conditions. If a biotechnical bank stabilization approach is not feasible, up to one hardscaped project will be conducted each year. For all hardscaped engineered solutions, the County will provide justification on the selected stabilizing approach to NMFS and the Corps for review and approval. Approaches may include structural fixes such as soldier pile retaining walls with concrete or wood laggings or slope soil nailing, both of which would typically be installed above the ordinary high water mark and fronted by vegetated boulder revetments or habitat features at the toe of the slope.

Equipment used for bank repair activities may include extending arm excavators, small bulldozers, front-end loaders, and dump trucks. Staging for repair activities will occur on adjacent access roads. Access roads and other previously disturbed areas will also be used for staging soil and riprap.

There are several salmonid streams where maintenance activities could occur under this permit including sites at Gazos Creek, Alpine Creek, Tunitas Creek, Bradley Creek, and Mill Creek. For a more complete list of bio-engineered, hybrid and hardscaped bank stabilization methods proposed under this Program see Appendix A.

1.3.1.4 Vegetation Management

The Program's primary vegetation management activities include mowing, trimming and pruning, tree removal, herbicide application, grazing for vegetation management, and fallen tree removal. The County undertakes these types of vegetation management activities routinely and relatively consistently from year to year. The work locations often change yearly, but the type of work remains consistent. Some work locations are also routinely repeated each year. Some facilities may require annual vegetation maintenance while others do not. This largely depends on the type of vegetation in, or adjacent to, the road, trail, channel, or other facility and other environmental factors including the degree of solar input and soil and moisture conditions.

Typical activities include:

a) Fuel management activities such as maintaining firebreaks and removing invasive plants in County Parks and other maintained areas. Typical fuel management activities conducted by the County include selective tree thinning and selective removal of undergrowth of non-native

plants. Removal methods may involve use of herbicides, physical removal using work crews, or grazing;

b) Tree trimming, pruning and removal will be done if there is a public safety hazard at or near County maintained facilities. If the tree(s) removed are within riparian or wetland habitat, compensatory mitigation will be provided on site if feasible, at a ratio of 1.5:1 or offsite at a ratio of 3:1 for each tree/acre removed/affected. Tree removal may also be required for equipment access to perform repairs at culverts, bridges, bank stabilization, and slip-out sites, however only two non-hazardous trees per year may be removed for access to construction sites as described further below;

c) Herbicide application is done under County Integrated Pest Management (IPM) policy and includes chemical and mechanical methods for removing vegetation. Consistent with the County IPM policy, vegetation will be managed by applying non-pesticide alternatives on County owned or managed land where feasible and applying the least toxic pesticides to the maximum extent practicable. Herbicide application is only conducted when the climate is dry and when wind speeds do not exceed 7 miles per hour. For water bodies, herbicide use is limited to control non-native plant species where excess vegetation is determined to be the cause of sediment deposition and/or debris accumulations that result in flooding or damage to public facilities. Only herbicides suitable for water application and relatively non-toxic to fish, wildlife and invertebrates will be used (Clearcast®, Roundup Custom®, and Rodeo®). A complete list of approved herbicides that may be used in the Program is listed in Table 2 of the San Mateo Maintenance BA (H.T. Harvey & Associates, Feb 2020);

d) Grazing with livestock will be conducted to control growth of herbaceous weeds, brush, and non-native plants; and for fuel management purposes on County park lands. In addition to implementing all applicable BMPs, vegetation to be preserved will be fenced off as a protective measure, and grazing will be excluded from channels and other water sources;

e) Downed tree management will be conducted by the County to remove fallen trees in urban or high-use park settings if the fallen tree presents a safety or hazard risk. The County may also saw or chip the downed tree in place if the tree is in a low-use rangeland or watershed setting. When downed trees occur along stream courses, the County recognizes that the downed tree may be a resource to provide habitat functions. The County will strive for no net loss of LWD over the long-term. For projects requiring removal of large wood due to infrastructure safety or flooding concerns, the County, when feasible, will salvage useable wood (*i.e.,* rootwads, large diameter conifers) for reuse in future LWD mitigation and/or habitat improvement projects. Along a stream course, the downed tree will be evaluated for its potential to cause or increase erosion, flooding, bank failure, or negatively impact a facility such as a bridge or culvert. Within channels, downed trees may also be removed if channel capacity is significantly limited or if the tree is creating unacceptably high hydraulic roughness in the channel such that flows are diverted and thereby cause heightened erosion or flooding risk. If such erosion or flooding risks are unlikely, then the County will seek opportunities to maintain the downed tree as a habitat feature. Section 3.4.3.8 of the BA provides detail on evaluating downed trees and how the entire tree or

portions thereof may be integrated into watershed habitat features onsite or offsite and this is also discussed in *Section 1.3.2 Avoidance and Minimization Measures*;

f) The County may remove up to two non-hazardous trees greater than 12 inches in diameter per year from natural channels below ordinary high water if the trees are restricting the capacity of the channel, causing erosion or flooding, or limiting access to perform maintenance work. Trees will be cut at ground level and the root mass left in place to maintain bank stability. No non-hazardous trees greater than 36 inches in diameter will be removed under this program. If trees need to be removed they will be compensated with a ratio of 1.5:1 for onsite or a ratio of 3:1 for offsite restoration;

g) Invasive plant removal will be conducted at County airports and landfill sites. The County also removes invasive plants at recreation sites and trails as well as other County maintained sites. Methods used to remove invasive plants include a combination of hand removal, mechanical methods, and herbicide application, and grazing. Mechanical methods may involve use of a bladed weed-eater or an excavator with mower extension.

1.3.1.5 Road and Trail Maintenance

1.3.1.5.1 Unpaved Roads and Trails

The County is responsible for repairing and maintaining unpaved roadway surfaces in unincorporated County of San Mateo. In general, unpaved roads, particularly in steeper areas, are susceptible to rapid erosion if not maintained. Conducting routine maintenance on unpaved roads to reduce and prevent erosion in watershed lands is an important step in reducing downstream sediment impacts. Depending on roadway conditions, unpaved road surface activities may involve re-grading the road to its existing grade or original cut, repair of rolling dips, filling ruts, relocating road surface materials that have moved due to erosion, or re-establishing turn around areas for emergency vehicles. As described above, drainage pathways (*e.g.,* culverts) are monitored and repaired or cleaned as needed to minimize both damage to road surface and potential sedimentation effects on nearby water bodies.

Other maintenance activities include restoring trail surfaces with earthen materials and repairing water bars, rolling dips, and drainage ditches to prevent or reduce erosion and downstream sedimentation issues in nearby channels and creeks. These maintenance activities will help the County meet general objectives of the adopted Pescadero-Butano Watershed Sediment TMDL and draft San Gregorio Creek Sediment TMDL aimed at reducing sediment delivery to channels. In problematic areas, particularly those on steep slopes and switchbacks, the County may need to construct new rolling dips. The rolling dip configuration is a series of rolls and out-sloped dips that create small drainage divides and segments along a trail. Segmenting a trail with such drainage divides and improved drainage minimizes the ability of rainfall and other water to pond or to collect and flow down the trail at erosive velocity. In some instances, due to severe erosion or the presence of a landslide, short segments of a trail may require rerouting. Where rerouting a trail segment exceeds 50 feet in length, trail planning and construction is performed in accordance with Section 1.0, “Trails and Land Use Compatibility,” of the 2001 San Mateo County Trails Plan. Other trail maintenance work conducted by the County’s trail maintenance crews involve signage repair and installation, graffiti removal, and structure repairs.

1.3.1.5.2 Roadway Slip-Out and Slide Repairs

The County is responsible for repairing slip-out/slide repairs along County roads. Slope failures on the cut slope side of a roadway are typically referred to as "slides," whereas slope failures on the fill side are typically referred to as "slip-outs." Such repairs are performed on an as-needed basis to prevent additional failure of supporting soils or structures, and to reduce the potential hazard of falling debris. In some instances, the base of the roadway slide occurs along a stream course whose streambank has eroded. The streambank failure may be a consequence (non-cause) of the upslope larger slide surface; or the streambank failure may be the driving cause of the slide that affects the hillslope and roadway above. If the roadway slide involves a streambank, then the bank stabilization activities will follow the description provided in Section 1.3.1.3 and fall under the limitations in Table 3.

1.3.1.6 Marina Maintenance

The County is responsible for conducting routine maintenance activities at the Coyote Point Marina. The marina has 565 berths, a Harbormaster's Office, Yacht Club, fuel dock, a three-lane boat ramp, and a pump out facility. The marina also has a restroom facility and designated recreational areas open to the public. The existing marina docks were installed between 1976 and 1987, and since 1987, maintenance dredging has been conducted in two of the basins. No dredging activities are included in this Program. The following sections describe typical routine maintenance activities that occur at Coyote Point Marina.

1.3.1.6.1 Dock and Boat Launch Ramp Maintenance

Routine dock maintenance entails replacing damaged cleats, bumper striping, broken gussets, and gusset covers along the dock perimeters. Dock boxes are also inspected and periodically repaired and replaced. Repair activities may involve replacing rusty screws, bolts, and rotted plywood. On several docks, the concrete dock surface is cracked or has gaps between the concrete blocks. The County is responsible for sealing the gaps through either concrete spalling or replacing the dock blocks. At the boat launch ramps, the County is responsible for replacing damaged floats, cleats, and bumper striping. The County also removes debris present in the launch ramp lanes.

1.3.1.6.2 Pump Out Facility and Water Line Maintenance

The pump out facility is available to boaters for removing sewage from boats. The County is responsible for periodically cleaning out the ejector tank and sewer line and collecting annual pump out readings. County staff periodically inspect the dock water lines and valves to ensure they are functioning properly. The backwater preventer device is also inspected to ensure its operating correctly.

1.3.1.6.3 Channel Entrance and Breakwater Maintenance

In the channel entrance area that leads to open water, the County inspects the channel entrance pilings, day markers, entrance lights, and range lights. As needed, the County replaces bulbs and repairs the pilings by cleaning and wrapping the piles with a plastic pile. Other activities that occur in the channel entrance and breakwater include removing hazardous logs and driftwood and re-rocking the berm along the shoreline where rocks have fallen or sloughed away in order to prevent and minimize erosion. On an annual basis, the County also measures the depth of the channel entrance/breakwater to determine the need for future dredging of the channel entrance area.

1.3.2 Avoidance and Minimization Measures

AMMs are intended to eliminate or reduce the impacts of a project on listed fish and their critical habitat. The AMMs implemented will vary with the type of project, site-specific plans, and anticipated effects; however, many AMMs will be applied to every project. For example, in or near water projects should be planned to occur during NMFS recommended work window, from June 15 to October 15, in order to limit the potential impacts of the project to salmonids. Activities in the active stream channel should be avoided; if a stream is flowing, the work site should be isolated and dewatered prior to starting work. Some of the BMPs and AMMS are described in *Section 1.31. Description of Covered Activities* and a completed list of BMPs are included in Appendix A of this BO. AMMs on some specific activities are listed below:

a) *Dewatering* - instream channel work will occur during the dry season (June 15-October 15) and the work area will be isolated if there is flow in the channel by using cofferdams or clean water bypass. There will be a minimum spacing of 1,500 feet between dewatered sites in any given year. Prior to dewatering a construction site, all reasonable efforts will be made by qualified biologist(s) to capture and relocate listed salmonids. Capture methods may include fish landing nets, dip nets, buckets and by hand. Protocols regarding the safe handling and relocation of listed salmonids will be followed under BIO 2 described in Appendix A and further described in *Section 2.9.4 Terms and Conditions*;

b) *CCC coho salmon* - no dewatering will be conducted at sites with recent documented occurrences of CCC coho salmon within the past 5 years. Additionally, no dewatering of streams, including to isolate work areas, will occur where CCC coho broodstock hatchery fish will be released during the duration of this permit. All maintenance work in these identified streams, which currently include Gazos and Pescadero, must be done in the dry season when flow has ceased or receded from potential maintenance sites;

c) *Culvert Replacement* - installation or replacement of culverts is limited to 60-inch size diameter culverts or smaller or to convey adequate flow (*i.e.,* 100-year flow where feasible). Typically, each site will be between 25 to 60 feet in length. Work activities on non-salmonid bearing streams would be limited to 150 feet in length per site and 1,500 linear feet for all such culvert repair/replacement projects in a year. Culvert repair and replacement activities on salmonid-bearing streams are limited to 100 feet per site and one such project per year (Table 3). Design plans for culvert repair or replacement on salmonid streams that may affect fish passage must be reviewed and approved by NMFS before being eligible for inclusion in this Program;

d) *Channel Maintenance* –-activities will be limited to minor patching and repair of concrete channel walls and beds; in-kind repair of existing channel rock slope protection (replacing the immediately missing or damaged rocks); maintaining tide gates by clearing debris blockages and replacing the flaps on tide gates where necessary; and minor floodwall and levee maintenance (*e.g.,* graffiti removal) conducted to return floodwalls to its as-built design. Levee maintenance is limited to minor repair of existing levees to maintain structure integrity (*i.e.,* filling in burrows, replacing fallen rocks, repairing cracks, and repairing slip-outs);

e) *Bridge Maintenance* - maintenance and repair activities will occur within the bridge footprint or immediately adjacent area, within 25 feet upstream or 25 feet downstream of the bridge. The total annual channel work limits associated with bridge maintenance would be 500 linear feet;

f) *Sediment Removal* - at culverts and crossings, work activities would be limited to 150 linear feet or less per work site. The County is typically limited to working within the width of the County's road right-of-way (100-foot width or less). At channels, sediment removal activities shall be limited to focused localized sites that are 500 feet in length or less per site. If maintenance is necessary when there is water within the channel, dewatering would be conducted through the use of cofferdams or a clean water bypass. Project, annual and Program limits on sediment removal and dewatering are included in Table 3;

g) *Bank stabilization* - projects will emphasize the use of bio-engineering methods whenever possible to reduce environmental impacts. A thorough review of the sites geomorphic conditions will be evaluated to assess feasibility of bio-engineered methods. If hardscape is to be used, it would typically be installed above the ordinary high water mark and fronted by vegetated boulder revetments or habitat features at the toe of the slope. Generally a distance of at least 1,500 feet would be maintained between bank stabilization sites; however, because the specific location of bank stabilization repairs cannot be known ahead of time, in the event that two or more repairs would need to occur within a 1,500 creek or road distance, the County would contact NMFS to explain the specific conditions under which repairs are sought;

h) *Downed tree management* - occurs when a downed tree is significantly decreasing flood conveyance capacity or deflecting streamflow causing bank erosion. The County considers these factors when determining whether a downed tree should be preserved, repositioned, or removed from the site and/or reused off-site. The County may either leave the tree in place and monitor in case conditions change that necessitate further management options. These options include: limb downed tree branches; cut downed tree into smaller pieces; repositioning the downed tree; securing the downed tree in place; removing the downed tree and reusing in another site;

i) *Environmental awareness training* - will be conducted prior to the start of maintenance activities within any given year. Review of special-status species, sensitive habitats, and other sensitive resources that may exist in the project area, including field identification will be included. The training will cover the maintenance activity's conservation measures, environmental permits, and regulatory compliance requirements, as well as the roles and authority of the monitors and biologist(s). It will include printed material and an oral training session by a qualified biologist;

j) *Staging and access areas* - will be located outside of sensitive habitat and 30 feet from the top of bank or on the outboard side of levees to the extent feasible. Vegetation removal shall be limited to the minimum amount necessary to provide access. When in-channel work is required, where available use existing ingress or egress points or perform work from the top of the stream banks;

k) *Areas of disturbance* - will be limited to the smallest footprint necessary and a single access pathway, where feasible. For maintenance activities near waterways or other sensitive habitat,

the designated work area shall be clearly identified in the field using highly visible material, and work will not be conducted outside this area. Excavated soil and materials will not collect into the street or get transported to storm drains or nearby water bodies by rainfall or runoff;

l) *The disturbance or removal of vegetation* - shall not exceed the minimum necessary to complete maintenance activities. The use of bulldozers, backhoes, or other heavy equipment to remove vegetation along stream banks shall be avoided wherever feasible;

m) *Large wood, native vegetation or weed* - free topsoil displaced by project activities may be stockpiled for use during site restoration. Berm and cover stockpiles of sand, dirt or other construction material with tarps when rain is forecast or if not actively being used within 14 days;

n) *Hazardous materials and hazardous waste* - will be appropriately labelled, applied, stored and disposed of according to label and/or in accordance with city, county, state, and federal regulations. Chemicals will not be applied outdoors when rain is forecast within 24 hours;

o) *Spill and prevention control* - will be followed according to BMP Gen-7 in Appendix A of BO;

p) *Erosion control meas*ures - will be implemented in maintenance sites and are listed as EC1 through EC 14 of the BMPs in Appendix A of this BO;

q) *Water quality control measures* - will be implemented in maintenance sites and are listed as SC1 through SC8 of the BMPs in Appendix A of this BO.

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

1.4 Implementation Procedure

The following section outlines the procedure for implementing the Program including timelines for planning, review, and reporting requirements.

In general, maintenance activities take place on an annual cycle as shown in Table 4, depending on whether they are non-ground disturbing activities and/or conducted away from bodies of water or ground disturbing activities near bodies of water.

Table 4. Timeline for Program Maintenance Activities

Timeline for activities that are ground disturbing and/or near bodies of water				
January - February	February - March	April - May	June - October	November - December
Assess facility maintenance needs	Prioritize maintenance activities and develop a work plan (includes AMMs and BMPs)	Notify and coordinate with regulatory agencies	Conduct maintenance activities	Prepare summary maintenance report and update maintenance database and AMM or BMP list

Timeline for activities that are ground disturbing and/or near bodies of water			
Timeline for non-ground disturbing maintenance activities			
January - February	February - March	March - November	December
Assess facilities and upland vegetation conditions	Prioritize maintenance activities and develop a work plan (includes AMMs and BMPs)	Conduct necessary resource surveys and maintenance activities. mowing: generally March - August culvert cleaning: typically late spring – summer grazing: late spring or early summer	Prepare summary maintenance report and update maintenance database and AMM or BMP list

1.4.1 Pre-Project Planning

For maintenance activities that involve ground disturbance near wetlands or other jurisdictional waters, such as sediment removal from creeks/channels, culvert replacement, and bank stabilization or slip-out repairs; the County will conduct a maintenance evaluation at each facility during January and February. A characterization sheet that describes the project including summarizing biological resources conditions, water quality, and maintenance needs will be produced or updated and reviewed for accuracy during the site visit. During February to March, an annual maintenance work plan will be developed for ground-disturbing activities based on the assessment and prioritization process.

Following identification of the treatment approach for ground-disturbing maintenance activities, the County's biologist will determine the appropriate AMMs and activity-specific BMPs. Note that all projects (both non-ground-disturbing activities and ground-disturbing projects) will utilize appropriate program-wide BMPs for impact avoidance and minimization as identified in Chapter 9 and appendix B and C of the BA (H.T. Harvey & Associates, Feb 2020). The County will determine which maintenance activities will require an on-site biologist during construction and which will require compensatory mitigation. A tiering approach described briefly below will guide development of the mitigation plan.

Tier 1 – No Impact. Maintenance activities would occur in creek reaches inaccessible to federally listed fish. No compensatory mitigation would be necessary.

Tier 2 – Low Impact. Maintenance activities would occur in areas where federally listed species are known to occur or could possibly occur. However, for these activities, impacts on individuals can be avoided through implementation of avoidance and minimization measures (*e.g.,* preconstruction surveys, exclusion of individuals from the project site, and/or implementation of non-disturbance buffers). Depending on the sensitivity of the work area and the likelihood that individuals could move into the work area after preconstruction surveys are conducted, some of these activities may require an on-site biological monitor to remain in Tier 2. For Tier 2 activities, "take" in the form of permanent loss of habitat should not occur, and therefore, no compensatory habitat mitigation would be necessary for Tier 2 activities.

Tier 3 – Moderate/High Impact. Similar to Tier 2, maintenance activities would occur in areas where federally listed species are known to occur or could possibly occur. However, for Tier 3 activities, federally listed species cannot be effectively excluded from the maintenance site, preconstruction surveys could not definitively determine the presence or absence of the species,

and/or "take" in the form of permanent loss of habitat cannot be avoided. Examples of Tier 3 sites might include culvert replacement projects in Coastside streams known for salmonid habitat or sediment removal projects in California red-legged frog habitat. For Tier 3 projects:

- During construction, these activities are expected to require implementation of standard BMPs and avoidance measures, and may require an on-site biologist.
- To offset any permanent impacts on sensitive species and/or habitat, compensatory mitigation may be needed. The mitigation ratio may vary depending on the magnitude of the impact and/or quality of habitat impacted.

1.4.2 Regulatory Agency Review

NMFS will be notified of the planned ground-disturbing maintenance activities by April 30th and provided the characterization sheets for projects scheduled that year. The work window for maintenance work that takes place in sensitive habitat and/or in channels below the ordinary high water mark is between June 15 and October 15. The annual maintenance work plan will identify specific treatment approaches, conceptual plans and/or design plans for each project that will be implemented. A summary description of design treatments selected, construction equipment to be used, access and staging, and discussion of why the treatment was selected will be provided. Details including the linear feet of channel to be disturbed, linear feet of the replacement culvert, details on salmonid habitat upstream and downstream if culvert is located on stream, length of the bank repair, and volume of sediment to be removed will be provided. In addition, the acres of waters of the U.S. and waters of the state will be described and the type and amount of riparian vegetation or LWD removed. For maintenance projects that will affect fish passage, the County will notify NMFS about such projects in the notification report for the year prior to construction and include preliminary design concepts. The County would coordinate with NMFS throughout the design process to ensure that these maintenance projects meet applicable NMFS criteria. For each project proposed to be covered under the Program, the County will review the project to determine whether it meets the following criteria and is therefore appropriately considered to be part of the Program:

a. The proposed project falls within the description of a Program activity.

b. Occurs within the boundaries of the San Mateo County Program Maintenance Area.

c. Is designed within the project limits and cumulative program limits specified in the Programmatic Biological Assessment.

d. Will not include any action specifically excluded from the Program.

e. The proposed project identifies mitigation. This may include fee payment, restoration in lieu of fees, an approach for post-project site restoration, and/or offsite restoration that provides improvement in watershed health and benefits to species to be reviewed and approved by NMFS.

1. Electronic Notification

Once the County makes a determination that a project should be included in the Program, the County will submit a project package to NMFS for review and acceptance at least 30 days prior to the start of

construction. The project package should be submitted electronically to the Central Coast Branch Chief at NMFS' Santa Rosa Office (Mandy.Ingham@noaa.gov).

a. The project package must include the following items:

i. Action Notification Form (Appendix B),

ii. Detailed project description (characterization sheets),

iii. Design plans that are at least 60% complete,

iv. Fish handling and relocation plan (if necessary),

v. Site specific mitigation plan (if necessary).

2. Reporting Requirements

The County will submit the following reports to the NMFS Santa Rosa Office:

a. Post-Project Construction Report. The County will submit a Project Construction Report by January 15 of the year immediately following construction. 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; the number of salmonids killed or injured; and photos taken before, during, and after the activity from the same reference points.

b. Fish Relocation Report. The County will submit a Fish Relocation Report by January 15 of the year immediately following construction. The report must include the date and time of the relocation effort(s); a description of the location from which fish were removed and the release site, including photographs; a description of the equipment and the 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 salmonid 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.

c. Site Restoration Report. The County will submit a Site Restoration Report by January 15 of the year immediately following completion of the site restoration associated with project-specific impacts.

d. Annual Program Report. The County will describe the efforts to carry out the Program, in the RGP Annual Report. The annual report will include an assessment of overall Program activity, a map showing the location of each action authorized under the Program, a summary of the extent of take indicators, and any other data or analyses the County deems necessary or helpful to assess the habitat trends as a result of the actions authorized under the Program.

e. Annual Coordination Meeting. The County will convene an annual coordination meeting with NMFS and the Corps by June 1 each year to discuss the annual reports and

any actions that can improve conservation or make the Program more efficient or accountable.

f. **Revocation or Termination**. NMFS or the Corps may end the program at any time if it determines the Program is not being implemented as intended.

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

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

The Corps determined the proposed action is not likely to adversely affect North American green sturgeon southern DPS (green sturgeon), but would adversely affect their critical habitat. NMFS concurs that the proposed action is not likely to adversely affect this species; however, NMFS did not concur with the Corps' critical habitat findings and determined that the Project is not likely to adversely affect green sturgeon designated critical habitat. NMFS' concurrence regarding green sturgeon and subsequent determination on their critical habitat is documented in the "Not Likely to Adversely Affect" Determinations section (2.12).

2.1 Analytical Approach

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

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

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

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

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

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

To assess the status of the species in the action area, several sources were used with emphasis placed on recent surveys when possible. Few streams had multi-year continuous salmonid surveys so there are several data gaps regarding presence/absence and overall abundance. A full list of literature sources reviewed is provided in this BO. Additionally, data on species presence was gathered from previous NOAA authorizations and permits for the listed species including previous section 7 consultations in the action area.

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 Species Description and Life History

The biological opinion analyses the effects of the federal action on the following Federally-listed species (Distinct Population Segment (DPS) or Evolutionary Significant Unit (ESU)) and designated critical habitat:

Central California Coast (CCC) steelhead trout DPS (*O. mykiss*)
Threatened (71 FR 834, January 5, 2006)
Critical habitat (70 FR 52488, September 2, 2005);

Central California Coast (CCC) coho salmon ESU (*O. kisutch*)
Endangered (70 FR 37160, June 28, 2005)
Critical habitat (64 FR 24049; May 5, 1999).

The CCC steelhead trout DPS (steelhead) includes steelhead in coastal California streams from the Russian River to Aptos Creek, and the drainages of Suisun, San Pablo, and San Francisco Bays (71 FR 5248). The CCC coho salmon ESU (coho salmon) includes coho from Punta Gorda in northern California south to, and including, Aptos Creek in central California, as well as populations in tributaries to San Francisco Bay, excluding the Sacramento- San Joaquin River system (61 FR 56138). The southern DPS of green sturgeon consist of populations originating from coastal watersheds south of the Eel River, with spawning confirmed in the Sacramento River system (Adams et al. 2002).

The action area is within designated critical habitat for CCC steelhead trout and CCC coho salmon. CCC steelhead trout critical habitat is designated from the Russian River to the San Lorenzo River to a lateral extent of ordinary high water (OHW) in freshwater stream reaches, and to extreme high water in estuarine areas. CCC coho salmon critical habitat is designated to include all river reaches assessable[3] to listed coho salmon from Punta Gorda in northern California south to the San Lorenzo River in central California, including Arroyo Corte Madera Del Presidio and Corte Madera Creek, tributaries to San Francisco Bay. Critical habitat consists of the water, substrate, and adjacent riparian zone of estuarine and riverine reaches (including off-channel habitats).

2.2.1.1 General Life History of Listed Species

2.2.1.1.1 CCC Steelhead Trout

CCC steelhead trout are identified as all naturally spawned anadromous *O. mykiss* (steelhead) originating below natural and manmade impassable barriers from the Russian River to and including Aptos Creek, and all drainages of San Francisco and San Pablo Bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin Rivers. Also included are steelhead from two artificial propagation programs: the Don Clausen Fish Hatchery Program, and the Kingfisher Flat Hatchery Program (Monterey Bay Salmon and Trout Project) (71 FR 834).

Steelhead are the anadromous form of *O. mykiss*, spawning in freshwater and migrating to marine environments to grow and mature. Steelhead have a complex life history that requires successful transition between life stages across a range of freshwater and marine habitats (i.e., egg-to-fry emergence, juvenile rearing, smolt outmigration, ocean survival, and upstream migration and spawning). Steelhead exhibit a high degree of life history plasticity (Shapovalov and Taft 1954; Thrower et al.

[3] Accessible reaches are those within the historical range of the ESU that can still be occupied by any life stage of coho salmon. Inaccessible reaches are those above longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years) and specific dams within the historical range of the ESU identified in 64 FR 24049.

2004; Satterthwaite et al. 2009; Hayes et al. 2012). The occurrence and timing of these transitions are highly variable and generally driven by environmental conditions and resource availability (Satterthwaite et al. 2009; Sogard et al. 2012).

Steelhead are generally divided into two ecotypes based on timing and state of maturity when returning to freshwater: summer-run and winter-run. Winter-run steelhead are the most common ecotype and are the only ecotypes expressed in the CCC steelhead DPS. Winter-run steelhead enter natal streams as mature adults with well-developed gonads. They typically immigrate between December and April and spawn shortly after reaching spawning grounds (Shapovalov and Taft 1954; Moyle et al. 2008).

Adult steelhead spawn in gravel substrates with low sedimentation and suitable flow velocities. Females lay eggs in redds, where they are quickly fertilized by males and covered. Egg survival depends on oxygenated water circulating through the gravel, facilitating gas exchange and waste removal. Adults usually select spawning sites in pool-riffle transition areas of streams with gravel cobble substrates between 0.6 to 10.2 centimeters (cm) in diameter and flow velocities between 40-91 cm per second (Smith 1973; Bjornn and Reiser 1991). Eggs incubate in redds for approximately 25 to 35 days depending on water temperature (Shapovalov and Taft 1954). Incubation time depends on water temperature, with warmer temperatures leading to lower incubation periods due to increased metabolic rates. Eggs hatch as alevin and remain buried in redds for an additional two to three weeks until yolk-sac absorption is complete (Shapovalov and Taft 1954). Optimal conditions for embryonic development include water temperatures between 6 and 10°C, dissolved oxygen near saturation, and fine sediments less than 5% of substrate by volume (Bjornn and Reiser 1991; USEPA 2001).

Upon emerging from redds, juvenile steelhead occupy edgewater habitats where flow velocity is lower and cover aids in predator avoidance. Rearing juveniles feed on a variety of aquatic and terrestrial invertebrates. As they grow, juveniles move into deeper pool and riffle habitats where they continue to feed on invertebrates and have been observed feeding on younger juveniles (Chapman and Bjornn 1969; Everest and Chapman 1972). Juveniles can spend up to four years rearing in freshwater before migrating to the ocean as smolts, although they typically only spend one to two years in natal streams (Shapovalov and Taft 1954; Busby et al. 1996; Moyle 2002). Successful rearing depends on stream temperatures, flow velocities, and habitat availability. Preferred water temperature ranges from 12 to 19°C and sustained temperatures above 25°C are generally considered lethal (Smith and Li 1983; Busby et al. 1996; Moyle 2002; McCarthy et al. 2009). In Central California streams, juvenile steelhead are able to survive peak daily stream temperatures above 25°C for short periods when food is abundant (Smith and Li 1983). Response to stream temperatures can vary depending on the conditions to which individuals are acclimated, however, consistent exposure to high stream temperatures results in slower growth due to elevated metabolic rates and lower survival rates overall (Hokanson et al. 1977; Busby et al. 1996; Moyle 2002; McCarthy et al. 2009).

Juveniles undergo behavioral, morphological, and physiological changes in preparation for ocean entry, collectively called smoltification. Juveniles begin smoltification in freshwater and the process continues throughout downstream migration with some smolts using estuaries for further acclimation to saltwater prior to ocean entry (Smith 1990; Hayes et al. 2008). Juveniles typically will not smolt until reaching a minimum size of 160 mm (Burgner et al. 1992). Smoltification is cued by increasing photoperiod. Stream temperatures influence the rate of smoltification, with warmer temperatures leading to more

rapid transition. Downstream migration of smolts typically occurs from April to June when temperature and stream flows increase. Preferred temperature for smoltification and outmigration is between 10 and 17°C with temperatures below 15°C considered optimal (Hokanson et al. 1977; Wurtsbaugh and Davis 1977; Zedonis and Newcomb 1997; Moyle 2002; Myrick and Cech 2005). In coastal systems with seasonal lagoons, smolts may take advantage of higher growth potential in productive lagoon habitats before ocean entry (Osterback et al. 2018).

Adult steelhead are known to be highly migratory during ocean residency but little is known of their habitat use and movements. They have been observed moving north and south along the continental shelf, presumably to areas of high productivity to feed (Barnhart 1986). Adults will typically spend one to two years in the ocean, feeding and growing in preparation for spawning (Shapovalov and Taft 1954; Busby et al. 1996). Upstream migration typically begins once winter rains commence and stream flows increase. For coastal systems with seasonal freshwater lagoons, winter storms are required to breech the sandbars and allow access to upstream spawning sites. Within the action area, CCC steelhead migrate through large, permanently open bays; San Francisco Bay and Monterey Bay, respectively. Unlike most salmon species, steelhead are iteroparous, meaning they can return to spawn multiple times. Adult steelhead may spawn up to four times in their lifetime, although spawning runs predominantly consist of first-time spawners (~59%) (Shapovalov and Taft 1954). The maximum life span of steelhead is estimated to be nine years (Moyle 2002).

2.2.1.1.2 CCC Coho Salmon

CCC coho are identified as naturally spawned coho salmon originating from rivers south of Punta Gorda, California to and including Aptos Creek, as well as such coho salmon originating from tributaries to San Francisco Bay. Also, coho salmon from three artificial propagation programs are included: the Don Clausen Fish Hatchery Captive Broodstock Program; the Scott Creek/King Fisher Flats Conservation Program; and the Scott Creek Captive Broodstock Program.

The life history of the coho salmon in California has been well documented (Shapovalov and Taft 1954; Hassler 1987; Weitkamp et al. 1995). In contrast to the life history patterns of other anadromous salmonids, coho salmon in California generally exhibit a relatively simple three year life cycle. Adult salmon typically begin the immigration 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). Coho salmon are typically associated with small to moderately-sized coastal streams characterized by heavily forested watersheds; perennially-flowing reaches of cool, high quality water; dense riparian canopy; deep pools with abundant overhead cover; instream cover consisting of large, stable woody debris and undercut banks; and gravel or cobble substrates (Sandercock 1991). Immigration continues into March, generally peaking in December and January, with spawning occurring shortly after arrival at the spawning ground (Shapovalov and Taft 1954).

When in freshwater, optimal habitats for successful coho include adequate quantities of: (1) deep complex pools formed by large woody debris; (2) adequate quantities of water; (3) cool water temperatures (discussed in more detail below); (4) unimpeded passage to spawning grounds (adults) and back to the ocean (smolts); (5) adequate quantities of clean spawning gravel; and (6) access to floodplains, side channels and low velocity habitat during high flow events.

Numerous other requirements exist (i.e., adequate quantities of food, dissolved oxygen, low turbidity, etc.), but in many respects these other needs are generally met when the six freshwater habitat requirements listed above are at a properly functioning condition.

Coho salmon are recognized to be the most temperature-intolerant of the Pacific salmonids and experience thermal stress in water temperatures as low as 16°C (Brett 1952). Laboratory studies have demonstrated that juvenile coho salmon growth and performance are optimized at temperatures between 11.4 and 14.5 °C (e.g., Coutant 1977; Reiser and Bjorn 1979; Bell 1986). Field observations generally confirm a relationship between cool thermal regimes and the presence of juvenile coho salmon. When maximum weekly average water temperatures exceed 18°C coho salmon were absent from otherwise suitable rearing habitat; temperatures between 12-14°C are preferred; and the upper lethal limit is between 25-26°C (Welsh et al. 2001). Temperature intolerance is particularly concerning in light of climate change predictions for the southernmost range of coho salmon historic habitat. Recent studies have demonstrated that adequate food resources may offset the metabolic costs of elevated water temperatures to some extent (Brewitt et al. 2017). Osterback et al. (2018) reported positive growth by juvenile coho salmon in a central California coastal freshwater lagoon despite mean daily water temperatures > 20 °C and attributed these results, in part, to high standing stocks of invertebrate prey. More recently, a study in a California stream demonstrated that coho salmon in pen enclosures subjected to a natural gradient of stream water temperature and prey availability, experienced absolute growth rate peaks at a mean daily average water temperature of 16.6 °C and an associated maximum weekly maximum temperature (MWMT) of 21.1 °C. Juvenile growth under these thermal conditions was sixfold greater than the growth rates observed for conspecifics rearing in the coolest study reach (Lusardi et al. 2019).

Coho salmon eggs generally hatch after four to eight weeks, depending on water temperature. Survival and development rates depend, in part, on fine sediment levels within the redd. 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 (Baker and Reynolds 1986). 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 redd from two to seven weeks before emerging from the gravel (Shapovalov and Taft 1954). Upon emergence, fry seek out shallow water, usually along stream margins. As they grow, juvenile coho salmon often occupy habitat at the heads of pools, which generally provide an optimum mix of high food availability and good cover with low swimming cost (Nielsen 1992). In the spring, as yearlings, juvenile coho salmon undergo a physiological process, or smoltification, which prepares them for living in the marine environment. Emigration timing is correlated with precipitation events and 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).

2.2.2 Status of Listed Species

NMFS assesses four population viability parameters to discern the status of the listed ESUs and DPSs and to assess each species ability to survive and recover. These population viability parameters are: abundance, population growth rate, spatial structure, and diversity (McElhany et al. 2000). While there is insufficient data to evaluate these population viability parameters quantitatively, NMFS has used existing information to determine the general condition of the populations in the CCC steelhead trout

DPS, CCC coho salmon ESU, and North American green sturgeon southern DPS and factors responsible for the current status of these listed species.

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

2.2.2.1 CCC Steelhead Trout

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

Abundance data for CCC steelhead are limited, however, existing information indicates population abundances have been substantially reduced from historical levels. In the mid-1960's, a total of 94,000 adult steelhead were estimated to spawn in CCC steelhead rivers, including 50,000 fish in the Russian River, the largest population in the DPS (Busby et al. 1996). Although steelhead occur in the Russian River, the ratio of hatchery fish to natural origin fish remains a concern. Abundance estimates for smaller coastal streams in the DPS indicate low but stable levels with recent estimates for several streams (Lagunitas, Waddell, San Vicente, Pudding, and Caspar creeks) at individual run sizes of 500 fish or less (62 FR 43937). Some loss of genetic diversity has been documented and attributed to previous among-basin transfers of stock and local hatchery production in interior populations in the Russian River (Bjorkstedt et al. 2005). In San Francisco Bay streams, reduced population sizes and habitat fragmentation has likely also led to loss of genetic diversity in these populations.

CCC steelhead have experienced serious declines in abundance and long-term population trends suggest a negative growth rate, indicating the DPS may not be viable in the long-term. DPS populations that historically provided enough steelhead immigrants to support dependent populations may no longer be able to do so, thereby putting dependent populations at increased risk of extirpation. Recent status reviews and return data indicate an ongoing potential for the DPS to become endangered in the future (Good et al. 2005). In 2006, NMFS issued a final determination that the CCC steelhead DPS is a threatened species, as previously listed (71 FR 834). A CCC steelhead viability assessment completed in 2008 concluded that populations in watersheds that drain to San Francisco Bay are highly unlikely to be viable, and that the limited information available did not indicate that any other CCC steelhead populations could be demonstrated to be viable (Spence et al. 2008). For more detailed information on trends in CCC steelhead abundance, see: Busby et al. 1996; Good et al. 2005; Spence et al. 2008; Spence et al. 2012; Williams et al. 2011; and Williams et al. 2016.

The California Coastal Monitoring Program (CMP) has recently initiated monitoring for CCC steelhead in Santa Cruz County south of the action area. New information from three years of the CMP indicates that population sizes there are perhaps higher than previously thought. However, the long-term downward trend in the Scott Creek population, which has the most robust estimates of abundance, is a source of concern. The viability of San Francisco Bay watershed populations remains highly uncertain. Population-level estimates of adult abundance are not available for any of the seven independent populations inhabiting the watersheds of the coastal strata (Novato Creek, Corte Madera Creek, Guadalupe River, Saratoga Creek, Stevens Creek, San Francisquito Creek, and San Mateo Creek). The CMP does not have monitoring sites in the action area and the scarcity of information on CCC steelhead abundance continues to make it difficult to assess whether conditions have changed appreciably since the previous status review assessment of Williams et al. (2011). On May 26, 2016, NMFS chose to maintain the threatened status of the CCC steelhead (81 FR 33468). For more information on the California Coastal Monitoring Program, visit: calfish.org.

CCC steelhead are widely distributed throughout this San Francisco Coastal South HUC which contains all the Coastside streams in the Program Maintenance Area. Steelhead were once abundant in the San Gregorio Creek watershed but are believed to be at critically low levels. Pescadero Creek likely supports the most viable steelhead population in this HUC (Titus et al. 2002). Recent population surveys suggest a few to several hundred adult steelhead return to the largest watersheds within this HUC (San Gregorio and Pescadero). Results from these surveys indicate that populations in the these two watersheds number in the hundreds of fish, from 136 in San Gregorio Creek to more than 500 in Pescadero Creek. These values range from 7% (San Gregorio) to 27% (Pescadero) of the viability targets for these populations. (Williams et al. 2016).

2.2.2.2 CCC Coho Salmon

Historically, the CCC coho salmon ESU was comprised of approximately 76 coho salmon populations. Most of these were dependent populations that needed immigration from other nearby populations to ensure their long-term survival. Historically, there were 11 functionally independent populations and one potentially independent population of CCC coho salmon (Spence et al. 2008). The CCC coho salmon ESU is identified by five geographic diversity stratums. Information on population trends within most of these stratums has improved considerably since the 2011 status review. Most of the independent populations in the CCC coho salmon ESU are currently doing poorly and remain at critically low levels, with those in the southern Santa Cruz Mountains strata likely extirpated. Data suggests some populations show a slight positive trend in annual escapement, but the improvement is not statistically significant. Overall, all CCC coho salmon populations remain, at best, a slight fraction of their recovery target levels, and the continued extirpation of dependent populations continues to threaten the ESU's future survival and recovery (NMFS 2016).

A comprehensive review of estimates of historic abundance, decline, and present abundance of coho salmon in California is provided by Brown et al. (1994). They estimated that annual spawning numbers of coho salmon in California ranged between 200,000 and 500,000 fish in the 1940's, which declined to about 100,000 fish by the 1960's, followed by a further decline to about 31,000 fish by 1991. Brown et al. (1994) concluded that the abundance of California coho salmon had declined more than 94 percent since the 1940's, with the greatest decline occurring since the 1960's. More recent abundance estimates vary from approximately 600 to 5,500 adults (Good et al. 2005). Recent NMFS status reviews (NMFS 2001; NMFS 2003; Good et al. 2005; Spence et al. 2008) indicate that the CCC coho salmon are likely

continuing to decline in number. By the winter 2006/2007, native coho were estimated to have declined more than 99 percent in less than seventy years. Most spawning populations are reduced to less than fifty fish (Moyle et al. 2008). Recent status reviews for CCC coho salmon conclude that this ESU is presently in danger of extinction (NMFS 2001, NMFS 2003, Good et al. 2005, and Williams et al. 2011). Available information suggests that CCC coho salmon ESU is not able to produce enough offspring to maintain itself (population growth rates are negative). CCC coho salmon have experienced acute range restriction and fragmentation (Brown et al.1994). Many dependent populations that supported the species' overall numbers and geographic distributions have been extirpated. This suggests that populations that historically provided support to dependent populations via immigration have not been able to provide enough immigrants for many dependent populations for several decades. Adams et al. (1999) found that in the mid 1990's coho salmon were present in 51 percent (98 of 191) of the streams where they were historically present, and documented an additional 23 streams within the CCC coho salmon ESU in which coho salmon were found for which there were no historical records.

Recent genetic research in progress by both the NMFS Southwest Fisheries Science Center and the Bodega Marine Laboratory has documented a reduction in genetic diversity within subpopulations of the CCC coho salmon ESU (Bjorkstedt et al. 2005). The influence of hatchery fish on wild stocks has also contributed to the lack of diversity through outbreeding depression and disease. The near-term (10-20 years) viability of many of the extant independent CCC coho salmon populations (Garcia River, Gualala River, Russian River, and San Lorenzo River) is of serious concern.

On June 28, 2005, NMFS issued a final listing determination for CCC coho salmon, changing their status from threatened to endangered (70 FR 37160). The most recent status review (81 FR 33468) documents conditions for CCC coho salmon have not improved since the last status review in 2011 (Williams et al. 2011). Williams et al. 2011 concluded CCC coho were in danger of extinction. Updated information does not indicate a change in the biological risk category for CCC coho salmon since the time of the last status review (Williams et al. 2016). Based on this information, NMFS chose to maintain the endangered listing of CCC coho salmon (81 FR 33468). NMFS's recovery plan (NMFS 2012) for the CCC coho salmon ESU identified the major threats to population recovery. These major threats include: roads, water diversions and impoundments, and residential development.

2.2.2.3 Status of Critical Habitat

In designating critical habitat, NMFS considers the following requirements of the species: 1) space for individual and population growth and for normal behavior; 2) food, water, air, light, minerals, or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for spawning, reproduction, and rearing offspring; and, generally 5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of the species (50 CFR 424.12(b)). In addition to these factors, NMFS also focuses on Physical or Biological Features (PBF) and/or essential habitat types within the designated area that are essential to the conservation or protection (81 FR 7414). PBFs for CCC steelhead critical habitat and their associated essential features within freshwater include:

A. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development;

B. Freshwater rearing sites with:

1. Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
2. Water quality and forage supporting juvenile development; and
3. 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;

C. Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and over hanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

For the CCC steelhead DPS, approximately 1,465 miles of stream habitat, and 386 square miles of estuarine habitat are designated critical habitat (70 FR 54288). Critical habitat for the DPS has been designated in the following CALWATER Hydrologic Units: Russian River, Bodega, Marin, San Mateo, Bay Bridge, Santa Clara, San Pablo, and Big Basin. There were 0.6 stream miles (1.0 km) excluded because they overlap with the Native America tribal lands (Coyote Valley and Redwood Valley Rancherias). No lands controlled by the Department of Defense were excluded.

For CCC coho salmon, the following essential habitat types were identified: 1) juvenile summer and winter rearing areas; 2) juvenile migration corridors; 3) areas for growth and development to adulthood; 4) adult migration corridors; and 5) spawning areas. PBFs for coho salmon include adequate (64 FR 24049): (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions (64 FR 24049).

The condition of CCC steelhead trout and CCC coho salmon critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that currently depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat[4]: logging, agriculture, mining, urbanization, stream channelization and bank stabilization, dams, wetland loss, and water withdrawals (including unscreened diversions for irrigation). Habitat impacts of concern include altered streambank and channel morphology, elevated water temperature, lost spawning and rearing habitat, habitat fragmentation, impaired gravel and wood recruitment from upstream sources, degraded water quality/quantity, lost riparian vegetation, and increased sediment delivery into streams from upland erosion (Weitkamp et al. 1995; Busby et al. 1996; 64 FR 24049; 70 FR 37160; 70 FR 52488). Based on NMFS familiarity with the landscapes in which these critical habitats occur, these impacts continue to persist today. Widespread diverting of rivers and streams, as well as the pumping of groundwater hydraulically connected to stream flow, has dramatically altered the natural hydrologic cycle in many of the streams within the CCC steelhead DPS and CCC coho ESU. Alteration of flows results in migration delays, loss of suitable habitat due to dewatering and blockage; stranding of fish from rapid flow

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

fluctuations; entrainment of juveniles into poorly screened or unscreened diversions, and increased water temperatures harmful to salmonids. Some of these anthropogenic impacts have been reduced or eliminated, and more recently, multiple restoration actions aimed at improving critical habitat quality and access have been implemented that are intended enhance CCC steelhead trout and coho salmon abundances in the future. These include the modification or removal of fish passage impediments throughout CCC steelhead trout and coho salmon critical habitat. There have also been revised reservoir release schedules at several creeks including Crystal Springs Reservoir on San Mateo Creek, Calaveras Reservoir in the Alameda Creek watershed, Lake Sonoma on Dry Creek (Russian River), Lake Mendocino on the Russian River, and at several water diversion intakes in the San Francisquito Creek watershed. Additionally, large scale habitat restoration was recently completed at Pescadero Marsh Natural Preserve in San Mateo County opening access to Butano and Pescadero Creek which contain spawning habitat for CCC coho salmon and CCC steelhead trout. Still, the overall current condition of CCC coho salmon and CCC steelhead trout critical habitat remains degraded, and may not provide the full extent of conservation value necessary for the recovery of the species.

2.2.3 Environmental Factors Affecting CCC Steelhead Trout, CCC Coho Salmon and Critical Habitat.

Another factor affecting the rangewide status of green sturgeon and particularly CCC steelhead trout, CCC coho salmon and their critical 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 discernible change (Kadir et al. 2013). NMFS believes the impacts on listed salmonids to date are relatively minor but increasing because natural, and local, climate factors likely still drive most of the climatic conditions salmonids experience, and many of these factors have much less influence on salmonid abundance and distribution than human disturbance across the landscape. In addition, CCC steelhead trout and CCC coho salmon are not dependent on snowmelt driven streams and thus not directly affected by declining snow packs. Green sturgeon spawn solely in the Sacramento River, a highly regulated river, which is dependent on snowpack to keep temperature regimes suitable for spawning. Potential spawning for green sturgeon in the Feather River, another river dependent on snow pack, is limited in part by summer temperatures being too high for larval sturgeon under current reservoir management.

The threat to CCC steelhead trout, CCC coho salmon and green sturgeon 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). Many of these changes are likely to further degrade critical habitat by, for example, reducing stream flows during the summer and raising summer water temperatures.

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 2004; Osgood 2008; Turley 2008; Abdul-Aziz et al. 2011; Doney et al. 2012). These projections 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 includes all County facilities requiring maintenance (Program Maintenance Area) that are located throughout San Mateo County. This includes all County parks as well as County owned facilities located in unincorporated areas and in cities (Figure 1). Many of the County owned facilities in the Program Maintenance Area intersect with salmonid critical habitat through roads, bridges, culverts and trails.

In the Program Maintenance Area, steelhead are known to spawn in the San Mateo Creek, San Francisquito Creek, San Pedro Creek, Pilarcitos Creek, Lobitos Creek, Tunitas Creek, San Gregorio Creek, Pescadero Creek, Butano Creek, and Gazos Creek watersheds and could potentially occur in other coastal streams. This species has the potential to occur at 37 Program Maintenance sites that either have been maintained by the County in recent years or will likely require maintenance in the next 5 to 10 years. CCC coho salmon have historically spawned in Butano Creek, Pescadero Creek, Gazos Creek and San Gregorio Creek watersheds and have the potential to occur at 20 Program Maintenance sites (a subset of the 37 sites at which CCC steelhead trout may occur) that either have been maintained by the County in recent years or will likely require maintenance in the next 5 to 10 years. In addition, designated critical habitat includes all river reaches and estuarine areas accessible to CCC steelhead trout and CCC coho salmon in the Program Maintenance Area.

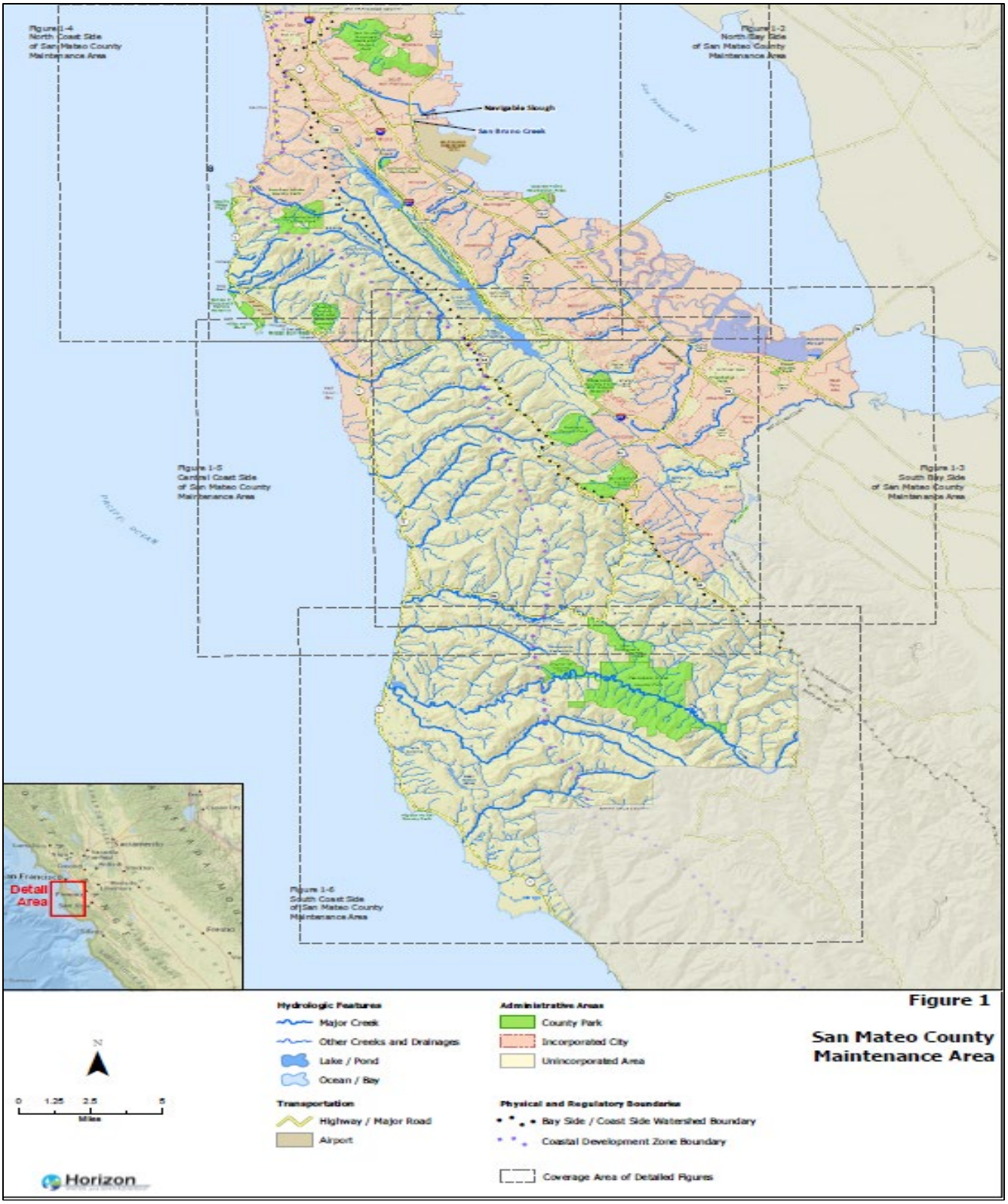

Figure 1. County of San Mateo Program Maintenance Area.

2.4 Environmental Baseline

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

2.4.1 General Watershed Description

The action area consists of two physiographic regions: (1) County areas draining to San Francisco Bay (Bayside); and (2) County areas draining to the Pacific Ocean (Coastside). The County is divided by the Santa Cruz Mountains, and these physiographic regions reflect the principal drainage patterns and directions. The topography of the County is extremely varied, with elevations ranging from sea level to 2,572 feet atop the Santa Cruz Mountains (County of San Mateo 1986). Overall, the County is characterized by dry, mild summers and moist, cool winters. However, temperatures are strongly influenced by the San Francisco Bay to the east, the Pacific Ocean to the west, and the Santa Cruz Mountains, which results in a variety of microclimates. The Coastside is mountainous and experiences a marine climate, characterized by cool, foggy summers and relatively wet winters while the Bayside is generally features a flat topography and is more warm and sunny.

There are several watersheds and streams in San Mateo County that drain directly to the Pacific Ocean and are designated critical habitat for CCC steelhead trout and CCC coho salmon. These fall under the San Francisco Coastal South HUC (18050006) and contain all of the Coastside watersheds from the Golden Gate Strait south to approximately the San Mateo/Santa Cruz county line. Several moderate-sized watersheds within the HUC include: Pilarcitos Creek, Gazos Creek, Arroyo Leon, Purisima Creek, Tunitas Creek, San Gregorio Creek, San Pedro Creek, Pescadero Creek, and Butano Creek. There is limited urban development within this HUC; agriculture (*e.g.,* Brussels sprouts and cattle) is the dominant land use within all of the watersheds. The majority of watersheds on the Coastside have little to no flood control modifications though there are smaller scale water diversions and water quality issues present. There are sparsely distributed towns and several State Parks and Open Space areas within this HUC.

On the Bayside, there are additional streams designated as critical habitat within the San Francisquito Creek watershed. Bayside streams are in urbanized settings which required flood control modifications and channelization of streams. Streams that once naturally flooded and meandered around hillsides before reaching San Francisco Bay were hardscaped and straightened into channels. It is believed that coho salmon are extirpated from these Bayside streams but CCC steelhead trout runs remain. Salmonids enter the San Francisquito watershed through South San Francisco Bay.

Priority streams for CCC coho salmon and CCC steelhead trout recovery include Gazos Creek watershed, Pescadero Creek watershed, San Gregorio Creek watershed, and Waddell Creek which borders Santa Cruz and San Mateo Counties (NMFS 2012).

2.4.2 Status of Listed Species in the Action Area

Several watersheds and streams within San Mateo County support or historically supported coho salmon and CCC steelhead trout runs. As mentioned above, there are two physiographic regions in San Mateo County, Coastside that drains into the Pacific Ocean and Bayside that drains into South San Francisco Bay. Within the Bayside action area, steelhead are known to spawn in the San Mateo Creek and San Francisquito Creek. Within the Coastside action area, coho salmon and steelhead occur or have the potential to occur at maintenance sites at San Pedro Creek, Pilarcitos Creek, Lobitos Creek, Tunitas Creek, San Gregorio Creek, Pescadero Creek, Butano Creek, and Gazos Creek watersheds and may potentially occur in other coastal streams.

2.4.2.1 Status of CCC Coho Salmon in the Action Area

CCC coho salmon have the potential to occur at 20 Program Maintenance Area sites (a subset of the 37 sites at which CCC steelhead trout may occur) that either have been maintained by the County in recent years or will likely require maintenance in the next 5 to 10 years (H.T. Harvey & Associates, Feb 2020).

CCC coho salmon inhabiting the Coastside streams of the action area are part of the Santa Cruz Mountain diversity stratum. Historical records document the presence of coho salmon in the Pescadero-Butano Creek, Gazos Creek and San Gregorio Creek watersheds. Collectively, these watersheds produced a combined average annual run of approximately 1,000 spawners during 1959-1963 (CDFG 1995). The San Mateo Coastside streams lost much of their coho salmon populations during the late 1970's early 1980's after decades of decline exasperated by the severe drought of 1976-1977 and continued expansion of land and water use in these watersheds (CDFG 1995). By the 1980's, it is believe that the only stream that supported active coho salmon runs south of San Francisco Bay was Scott Creek in Santa Cruz County and Waddell Creek which borders San Mateo and Santa Cruz County (Anderson 1995). Today, the run in Waddell Creek is extirpated and only Scott Creek maintains all three cohorts of coho salmon largely due to the conservation hatchery located on site (NMFS 2012). Occasional strays from the hatchery have successfully spawned in San Mateo County watersheds in recent years. The status of coho salmon in the Santa Cruz Mountain stratum, where virtually all observed salmon have been the result of hatchery operations, remains especially dire (Spence 2016). On the Bayside, CCC coho salmon was historically collected from San Mateo Creek (Leidy 2007) and may have been present in the San Francisquito Creek watershed (Leidy et al. 2005). However, it has been functionally extirpated from all County streams flowing to the Bay (Leidy 2007, NMFS 2012).

The Pescadero-Butano watershed contains approximately 55 miles of habitat and is identified as one of the independent populations essential for CCC coho salmon recovery under the NMFS recovery plan (NMFS 2012). Long-term data on the abundance of coho salmon in this watershed are limited. Five or fewer juvenile coho salmon were observed in 1999 in Peters Creek, a tributary to Pescadero Creek, but no juveniles were observed during surveys conducted in 2000 (NMFS 2001). More recently, spawning activity was observed in 2015. During the 2014-2015 spawning season, three coho salmon carcasses were recovered from Pescadero Creek, of which all three originated from hatchery releases into Scott Creek in Santa Cruz County (B. Spence, personal communication). Snorkel surveys in the summer of 2015 were unable to confirm successful reproduction in the mainstem Pescadero Creek or adjacent tributaries. Aside from artificial coho production supporting the Scott Creek population (and producing strays), the species appears extirpated, or nearly so, within other surrounding watersheds (Williams et al.

2016). Recent restoration of the Pescadero-Butano Creek Marsh has opened the possibility to release juvenile CCC coho from the Scott Creek Hatchery. In the fall of 2020, it is anticipated that 10,000 CCC coho parr (*i.e.,* lifestage that is pre-smolt) will be released into upper Pescadero Creek watershed and this may continue on a yearly basis. Restoration activities in the marsh may allow for juvenile rearing en route to the ocean and for access to the upper Butano Creek watershed for returning adults.

The Gazos Creek watershed contains about 7 miles of habitat and is identified as an independent population essential for CCC coho salmon recovery under the NMFS recovery plan (NMFS 2012). Gazos creek has had consistent multi-year surveys for salmonids and can provide recent abundance estimates. However, CCC coho have not been found in Gazos Creek since 2005 (Smith 2016). Hatchery fish were recently released into Gazos Creek in the summer of 2018 (Monterey Bay Salmon and Trout Project 2018) and subsequent juvenile surveys documented presence in September of 2018 with an estimated survival through September to be approximately 18% (Smith 2018). No data on subsequent yearly survival or adult returns is currently available.

The San Gregorio Creek watershed contains approximately 37 miles of historical coho salmon habitat. In the 1800s, the creek had large enough salmon runs to support commercial harvest (Skinner 1962). It is identified as a dependent population essential for the recovery of CCC coho salmon (NMFS 2012).

2.4.2.2 Status of CCC Steelhead Trout DPS in the Action Area

CCC steelhead trout are present in most San Mateo County streams though abundance has declined considerably since peak observations in the past. There are two streams in the Program Maintenance Area that are considered to be functionally independent: Pescadero Creek and San Gregorio Creek. There are four streams that are considered to be potentially independent: Pilarcitos Creek, Waddell Creek on the Coastside; and San Francisquito Creek, San Mateo Creek on the Bayside (Spence et al 2012). Functionally independent populations are those that have a high likelihood of persisting for 100 or more years and whose population dynamics and extinction risk are not substantially altered by exchanges of individuals with other populations. Potentially independent populations are independent populations that are too strongly influenced by immigration from other populations to exhibit independent dynamics (Bjorkstedt et al. 2005).

Within the entire Program Maintenance Area, CCC steelhead have the potential to occur at 37 Program Maintenance sites that either have been maintained by the County in recent years or will likely require maintenance in the next 5 to 10 years (BA Appendix B).

2.4.2.2.1 Bayside Populations: San Francisquito Creek and San Mateo Creek

The Bayside CCC steelhead populations belong to the Coastal San Francisco diversity strata. Steelhead are widely distributed throughout the Program Maintenance Area streams although population-level estimates of adult abundance are entirely lacking for populations that constitute the Coastal San Francisco Bay and Interior San Francisco Bay diversity strata (Williams 2016).

San Francisquito Creek - In the late 19th and early 20th centuries, San Francisquito Creek and its tributaries were home to a steelhead sport fishing industry (San Francisquito CRMP 2001). Three San Francisquito Creek tributaries downstream of Searsville Dam; Los Trancos, West Union, and Bear creeks, all currently support steelhead populations. Unfortunately, no robust data sets exists within

interior San Francisco Bay watersheds that would allow conclusions to be drawn regarding current population status or trends (Williams et al. 2016). In Los Trancos Creek, an intermittent tributary to San Francisquito Creek, estimates of juvenile steelhead abundance are available from construction dewatering activities in 2017: During June, 104 juvenile CCC steelhead were captured by electro fishing within 292 feet of stream; During July, 146 CCC steelhead were captured within 186 feet of stream; and during October, 31 juveniles were captured within 128 linear feet of stream although most fish were confined to pools due to seasonally low stream flow.

San Mateo Creek - Electro-fishing surveys in San Mateo Creek have occurred for several consecutive years below Crystal Springs Dam. During 2008 through 2019, average yearly density in sampled reaches of the creek were 38 juveniles per 100 feet, ranging from 8 juveniles in 2013 to 80 juveniles in 2018 (A. Brinkerhoff, personal communication 2020).

2.4.2.2.2 Coastside Populations: San Gregorio Creek, Pilarcitos Creek, Pescadero Creek, Butano Creek, Gazos Creek. San Pedro Creek, Lobitos Creek, Tunitas Creek

Coastside populations within the Program Maintenance Area belong to the Santa Cruz Mountain strata. Within the Santa Cruz Mountain stratum, a multi-year monitoring plan has recently been initiated. With the exception of the life-cycle monitoring station in Scott Creek (outside of the Action Area), estimates of adult abundance span only 1–3 years for populations in this stratum. Juvenile density data is not available for many streams but there have been either consistent or incidental monitoring in some streams that provide data on populations. Information on population estimates for San Gregorio Creek watershed, Pilarcitos Creek and Gazos Creek are described below. Although no data is available to estimate populations in most of the Coastside creeks, NMFS assumes CCC steelhead are present and utilizing available habitat within these watersheds.

San Gregorio Creek: Steelhead were once abundant in the San Gregorio Creek which forms at the confluence at La Honda Creek and Alpine Creek and flows 12 miles to the Pacific Ocean. Sampling in the lagoon has been conducted and steelhead are found yearly. Density estimates became available on Mindego Creek, a tributary to San Gregorio, in 2012 during construction activities where 58 to 189 steelhead juveniles were electro-fished in 100 feet of stream over several days. In Alpine Creek, another tributary to San Gregorio, 363 CCC steelhead were electro-fished from approximately 500 feet of stream in 2019.

Pilarcitos Creek: There have been long term multi-year surveys for CCC steelhead in recent years in Pilarcitos Creek. Sampling began in 2005 and is continuing yearly. Each year CCC steelhead juveniles are found in Pilarcitos Creek. During 2013 through 2019, average yearly density in sampled reaches of the creek were 38 juveniles per 100 feet, ranging from 18/100ft in 2019 to 68/100ft in 2017 (A. Brinkerhoff, personal communication 2020).

Gazos Creek: Long-term multi-year surveys have been conducted in Gazos Creek for approximately 30 years. In 2015 and 2016 some of the higher densities of late were seen of CCC steelhead at 31 and 32 juveniles per 100 feet, respectively. However, densities were down in 2017 to 21 juveniles per 100 feet and 26 juveniles per 100 feet in 2018 (Smith 2018). During 2009 through 2018, average yearly density in sampled reaches of the creek were 24 juveniles per 100 feet, ranging from 16/100ft in 2010 to

32/100ft in 2016 (Smith 2018). Logjams in the reach have been blocking accessible habitat to salmonids over the last several years.

2.4.3 Status of Critical Habitat in the Action Area

2.4.3.1 Status of CCC Coho ESU and CCC Steelhead DPS Critical Habitat

Designated critical habitat for CCC coho salmon in the action area includes all accessible reaches of all rivers including estuarine areas and tributaries. Designated Critical habitat for CCC steelhead encompasses the major watersheds and most of the streams on the Coastside but several Bayside streams are excluded, including San Mateo Creek. Essential features include substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions. The principle factors responsible for current steelhead and salmon habitat conditions in the action area include water diversions, sedimentation, channelization, and lack of riparian zone management.

2.4.3.1.1 Bayside

Critical habitat on the Bayside consists of the San Francisquito Creek watershed that drains into South San Francisco Bay. CCC coho salmon are believed to be extirpated from San Francisquito Creek watershed but CCC steelhead trout runs remain. The San Francisquito Creek watershed covers 42 square miles and drains into the South San Francisco Bay. Urban development is extensive within this watershed and has negatively affected the quality and quantity of salmonid habitat. The heavily urbanized watershed is listed on the Clean Water Act Section 303(d) list of impaired waters for high levels of Diazinon attributable to urban runoff as well as excess sedimentation from nonpoint sources (CRWRCB 2012). In the past 150 years, the diking and filling of tidal marshes has decreased the surface area of the greater San Francisco Bay by 37 percent. More than 500,000 acres of the estuary's historic tidal wetlands have been converted for farm, salt pond, and urban uses (San Francisco Estuary Project 1992). These changes have diminished tidal marsh habitat, increased pollutant loadings to the estuary, and degraded shoreline habitat due to the installation of docks, shipping wharves, marinas, and miles of rock riprap for erosion protection. Most tributary streams have lost habitat through channelization, riparian vegetation removal, water development, and reduced water quality. Dams blocking anadromy are present on many streams and are used for water supply, aquifer recharge, or recreational activities. Searsville Dam, constructed in 1890 and located approximately 13 miles from the San Francisquito creek mouth is an impassable barrier. Within the San Francisquito Creek watershed, Bear Creek and some of its tributaries including McGarvey Gulch provide moderate to high quality spawning and rearing habitat for steelhead. This portion of the watershed supports a well-established riparian corridor dominated by coast live oak, California bay woodland, and redwood forest. Water temperatures in Bear Creek and its tributaries appear to remain suitable (<20° C) for steelhead juvenile rearing during the summer and fall months. Habitat is available in Los Trancos Creek, in the lower reaches of West Union Creek, and in the upper reaches of San Francisquito Creek (Cogger et al. 1976).

The San Mateo Creek watershed includes three reservoirs: San Andreas Lake and the Upper and Lower Crystal Springs Reservoirs managed by the San Francisco Public Utilities Commission. It was not included in critical habitat designation for CCC steelhead due to economic reasons. However, historically, CCC coho salmon were present and CCC steelhead trout runs still remain (Leidy et al.

2005). The upper reach of the lower watershed of San Mateo Creek below Crystal Springs Dam consists of open space and sparsely developed residential areas of the cities of Hillsborough and San Mateo, California. This upper reach consists of closed canopy California oak woodland and serpentine grassland. In the lower phase of the middle reach, San Mateo Creek is fully culverted through downtown San Mateo. In the lowest reach, San Mateo Creek becomes tidal and discharges to San Francisco Bay.

2.4.3.1.2 Coastside

On the Coastside, three main watersheds historically supported CCC coho salmon as well as current CCC steelhead trout runs: San Gregorio, Pescadero-Butano and Gazos. Several other watersheds and streams that support CCC steelhead runs include: San Pedro, Pilarcitos, Lobitos Creek, and Tunitas Creek. Sedimentation has been a longstanding problem in the Pescadero-Butano Creek and San Gregorio Creek watersheds and they are listed as impaired for sediment under the Clean Water Act Section 303(d) list. The pollution factors for these streams are high coliform count and sedimentation/siltation. The potential sources of these pollutants are nonpoint sources.

The San Gregorio watershed has recently seen increasing residential development but remains primarily pastoral with cattle and sheep grazing, timber harvesting, and recreational trails being the main commercial uses. Because of the large private ownership and development potential, water diversions and low base flows are an important issue in this watershed. In 1993, water rights in the San Gregorio watershed were adjudicated and a minimum stream bypass flow was established. However, the prescribed bypass flows are too low to assure viable coho salmon populations. Recent restoration activities in this watershed include the Alpine Creek Fish Passage Project that was completed in 2019 restoring 3 miles of habitat for salmonids by modifying a culvert, removing a fish ladder and falling weirs, and reconstructing 425 feet of stream channel.

Within the Pescadero-Butano watershed, the Pescadero Lagoon and Marsh is the pathway to the Pacific Ocean for Pescadero and Butano Creek salmonids. Several years of sedimentation and flooding issues have degraded this estuary and caused numerous fish kills, including listed CCC steelhead, due to low oxygen levels. A recent restoration project has rechanneled the marsh and removed sediment that should reduce the anoxic conditions that caused fish kills. The first release of hatchery coho salmon into this watershed since restoration was completed will occur in fall of 2020.

Pilarcitos Creek provides water to local residents and has two dams to regulate flows and water supply. Impacts resulting from human activity have degraded the overall watershed condition, threatening habitat conditions for steelhead. In addition, water demand has increased with the growth of residential, agricultural, and industrial development in the Pilarcitos Creek watershed, decreasing the amount of water available for surface flow in streams. There are several stakeholders who have formed an integrated water management plan to better guide and protect beneficial uses in this watershed with a top priority being protection and enhancement of stream flow and riparian conditions to support steelhead and other native species.

Most of the Coastside streams have little to no flood control modifications and meander through dense forests in the higher elevations. Although they are relatively free from the infrastructure constraints on the Bayside of the County, there are challenges to the watershed including water diversions, lack of riparian management and water quality issues mentioned above.

The long-term effects of climate change have been presented above, and include temperature and precipitation changes that may affect steelhead trout, coho salmon, and critical habitat by changing water quality, streamflow levels, and salmonid migration in the action area. The threat to salmonids in in the action area from climate change is likely going to mirror what is expected for the rest of Central California. NMFS expects that average summer air temperatures in the action area would continue to increase, heat waves would become more extreme, and droughts and wildfire would occur more often (Lindley et al. 2007; Moser et al. 2012, Hayhoe et al. 2004, Moser et al. 2012; Kadir et al. 2013, Schneider 2007, Westerling et al. 2011). Many of these changes are likely to further degrade CCC steelhead trout and CCC coho salmon critical habitat throughout the action area by, for example, reducing streamflow during the summer and raising summer water temperatures.

2.4.4 Previous Section 7 Consultations in the Action Area

To date, the County has obtained regulatory permits for maintenance projects and activities on a case-by-case basis. Since 2000, there have been over 100 informal consultations that resulted in NMFS' concurrence that the proposed project was not likely to adversely affect ESA- listed species or their designated critical habitat. In general, the types of routine maintenance activities that have required regulatory permits include sediment and debris removal within culverts and bridges, culvert replacements, creek bank stabilization work, and road slip-out repairs. Although emergency maintenance actions are not included in the Program, the County conducted similar work at 27 emergency repair sites, some of which were within USACE and RWQCB's regulatory authority, during the 2012-2017 time period. Twelve of these locations required immediate attention in 2017 as a result of the severe storms that occurred in the winter. Such storms caused significant flooding, erosion, and damage to local roadways and required immediate attention to prevent complete failure of County roads and ensure safe access to County residents. Fourteen of the sites involved culverts and 13 sites were slip out/bank stabilization repair.

Since 2000, there have also been approximately 30 Section 7 formal consultations. The formal consultations were proposed actions that were likely to adversely affect ESA-listed fish species or their designated critical habitat, and resulted in biological opinions containing reasonable and prudent measures to minimize the impacts of incidental take of listed species. Examples of formal consultations within the action area include: bridge replacement; repair and shoulder widening; fish passage projects; bank stabilization; flood control structures; reservoir operations; restoration projects and scientific collecting permits described below.

NMFS' Section 10(a)(1)(A) research and enhancement permits and section 4(d) limits or exceptions occur in some of the watersheds covered under this Program, including the reaches within the action area. 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. There have been several scientific permits in the Program Maintenance Area include a five-year sampling survey in multi-lagoon, multi-creek study on Pescadero, San Gregorio and Pomponio watersheds. There have also been multi-year surveys in Pilarcitos Creek for monitoring of a restoration project as well as in Gazos Creek for salmonid population monitoring.

Stream restoration actions under programmatic consultations may take place in San Mateo County, including the reaches located within the action area. These programmatic consultations include the NOAA Restoration Center's restoration program and the Regional General Permit programmatic consultation with the California Department of Fish and Wildlife (CDFW). These consultations anticipate a limited amount of take for juvenile salmonids during instream work conducted in the summer months. NMFS determined these restoration actions are likely to improve habitat conditions for listed species and that the limited amount of take anticipated is unlikely to affect future adult returns.

2.5 Effects of the Action

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

Construction activities associated with the proposed projects in this Program may affect CCC coho salmon, CCC steelhead trout and their critical habitat. The following stressors may result from construction activities: unintentional direct injury or mortality during fish collection, relocation, and dewatering activities; temporary reductions in riparian vegetation and cover; permanent loss of benthic habitat; exposure to hazardous materials and contaminants from heavy machinery, construction materials and vegetation management; temporary increases in suspended sediments; and altered channel morphology.

2.5.1 Effects on CCC Coho and CCC Steelhead and Critical Habitat

2.5.1.1 Injury or Mortality from Fish Collection and Relocation

Some Program activities may require streams to be temporarily dewatered to complete work. In instances where dewatering is necessary, stream flow will be diverted around the project site and salmonids will be captured and relocated to a stream reach outside of the work area. Whether or not an individual project requires dewatering (and therefore salmonid collection and relocation) depends on the location, timing, and type of proposed project. Activities that have the potential to require salmonid collection, relocation, and dewatering include: bank stabilization, sediment removal and bridge or culvert repair and replacement. CCC steelhead and/or CCC coho relocation activities will occur outside the adult migration and spawning season, during the summer low-flow period after emigrating smolts and kelts (post-spawned adults) have left the creek (June 15 through October 15). Therefore, NMFS expects the CCC steelhead and/or CCC coho that may be captured and relocated will be limited to young-of-year and pre-smolting juveniles; however, encountering coho juveniles is not anticipated and, if encountered, would be extremely rare.

Salmonid 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 salmonid capture varies widely, depending on the method used, the ambient conditions, and the expertise and experience of the field crew. Because fish relocation activities will be

conducted by qualified fisheries biologists, direct effects to and mortality of juvenile salmonids during capture will be minimized.

Data on fish relocation efforts since 2004 shows most mortality rates are below three percent for steelhead (Collins 2004, CDFG 2005, 2006, 2007, 2008, 2009, 2010). Salmonids that avoid capture during relocation efforts may be exposed to risks described in the following section on dewatering. NMFS expects two percent of steelhead trout and/or coho salmon will be harmed or killed during fish capture and relocation activities.

Although sites selected for relocating salmonids should have similar water temperature as the capture sites and are expected to have adequate habitat available, in some instances relocated salmonids may endure short-term stress from crowding at the relocation sites. Relocated salmonids 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). NMFS does not expect impacts from increased competition would be large enough to adversely affect the survival chances of individual salmonids, 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 should be available within the stream to sustain relocated salmonids.

Data to quantify the anticipated number of juvenile steelhead trout or coho salmon in the Program Maintenance Area are not available for all watersheds and reaches. The precise numbers likely lost cannot be easily calculated due to the limited fish distribution and density information available in those areas, and the difficulty in observing these small aquatic organisms in the wild. CCC coho salmon are not expected to be present in most of the watersheds and streams with the exception of Gazos Creek and Pescadero Creek where broodstock hatchery releases occurred in recent years and releases are anticipated in upcoming years. Since the Program will not dewater areas where CCC coho salmon have been released or observed within the last five years, take is not expected to occur within those streams. However, because dewatering will occur with the Program Maintenance Area, which overlaps with CCC coho salmon critical habitat, incidental take is possible from populations not observed in recent years. Due to unknown estimates of juvenile coho salmon or steelhead trout within much of the Program Maintenance Area, NMFS will use the amount of habitat expected to be disturbed where salmonid relocation is anticipated to occur during the next five years as a surrogate for juvenile steelhead and juvenile coho killed or injured indirectly due to habitat destruction and construction activities. Anticipated take levels may be exceeded if the extent of channel maintenance activities are increased beyond what is described above in the Project and Program Limitations (Table 3), or in the AMMs and BMPS outlined in the Program description (Section 1.3). In addition, NMFS assumes that large trees, large woody debris, large rocks, *etc.* at the edges of channels will not be removed and may be enhanced during bioengineered bank stabilization activities. Should these elements be removed, anticipated take may be exceeded. If passage impediments to salmonid migration are repaired or replaced in kind that are not consistent with the NMFS' Guidelines for Salmonid Passage at Stream Crossings (May 2000) during channel maintenance activities, and remain during smolt or adult migration seasons, take may be exceeded. For listed salmonids that are collected in a dewatered site that has no available density

estimates, NMFS expects that no more than 2 percent of salmonids within the dewatering area will be injured, harmed, or killed during fish relocation activities. Furthermore, NMFS expects that no more than 1 percent of listed salmonids will be injured, harmed, or killed during dewatering activities. If more than 3 percent of the total number of juvenile salmonids captured are harmed or killed, incidental take will have been exceeded.

Density estimates for some watersheds and streams can be derived from juvenile salmonid monitoring that was conducted in the following areas: Gazos Creek, San Mateo Creek, Pilarcitos Creek, Los Trancos Creek a tributary to San Francisquito Creek watershed, and Mindego Creek and Alpine Creek, tributaries to San Gregorio Creek watershed. Examples of estimated densities and expected mortality for these streams and watersheds are presented in Table 5.

To estimate the number of juvenile salmonids (primarily juvenile steelhead; juvenile coho expected to be rare) that may be present in the Program Maintenance Area, we used data from fish surveys and monitoring efforts, where available, which provide the most recent accounts of juvenile salmonid densities in the vicinity of the proposed action area (Section 2.4.2). From these accounts, NMFS used the average of the most recent observations of juvenile salmonid densities for our estimates. NMFS will also assume an increase of 25 percent to account for annual variability in juvenile salmonid recruitment and habitat conditions. The 25 percent increase is based on NMFS' best professional judgement as to the likely variability in salmonid density during the five-year life of the Program.

To estimate the anticipated number of juvenile salmonids (primarily juvenile steelhead) to be collected and relocated as well as the associated estimates of mortality resulting from collection, relocation, and dewatering activities can be found in Table 5. For projects larger than 100 linear feet, the data in Table 5 may be used to calculate the number of juvenile salmonids (primarily juvenile steelhead) expected to be present within the length of dewatered channel as well as the estimated mortality from fish collection, relocation, and dewatering activities. If project construction is occurring in a stream not listed in Table 5, the density and mortality estimates for the closest, connected stream in the watershed may be used as the closest approximation. The annual actual take from the Program will be based on adhering to the Program limitations and conditions described above and not exceeding the estimated mortality for listed streams and watersheds in Table 5 and/or remaining below 3 percent mortality for non-listed watersheds and streams.

Table 5. Observations of juvenile salmonid (j.sal) densities for fish collection/relocation and dewatering activities (estimates for select streams derived from Section 2.4.2).

Watershed	Stream	Estimated Density (#j.sal/100ft)	Estimated Density with 25% increase	Collection/Relocation Mortality (2%)	Dewatering Mortality (1%)
	Coastside Streams				
Gazos	Gazos Creek	24/100 ft.	30/100 ft.	1	1
San Gregorio	Mindego Creek	124/100 ft.	155/100 ft.	3	2
	Alpine Creek	73/100 ft.	91/100 ft.	2	1
Pilarcitos	Pilarcitos Creek	38/100 ft.	48/100 ft.	1	1
	Bayside Streams				
San Francisquito	Los Trancos Creek	46/100 ft.	58/100 ft.	1	1
San Mateo	San Mateo Creek	38/100 ft.	48/100 ft.	1	1
Other Watersheds	Incidental take will be estimated based on adherence to project and Program limits, AMMs and BMPs. Additionally, no more than 3 percent mortality for total number of juvenile salmonids affected in dewatered reach from collection, relocation and dewatering.				

Note: Juvenile salmonids that avoid capture during relocation effects may be exposed to risks described in the following section on dewatering.

2.5.1.2 Dewatering Activities

As described above, projects proposed under this Program may require dewatering to complete the project. The maximum amount dewatered for sediment removal sites would be 750 feet whereas for bank stabilization or culvert repairs, dewatering if needed, will typically be under 300 feet. Cofferdams constructed out of gravel bags, inflatable dams, or other non-erosive materials in conjunction with pipeline bypass systems will be used to temporarily divert flows around work sites during construction. NMFS anticipates temporary changes to instream flow within and downstream of the project site during installation of the pipeline bypass system and during dewatering operations. Once the installation of the diversion pipe and the actual dewatering operation is completed, stream flow above and below the work sites should be the same as free-flowing pre-project conditions, except within the dewatered reach where stream flow is bypassed. These fluctuations in flow are anticipated to be small, gradual, and short-term, but are expected to cause temporary loss, alteration, and reduction of aquatic habitat, and, in the case of the areas that will be dewatered, will likely result in mortality of any salmonids that avoid capture during fish relocation activities.

Stream flow diversion and dewatering could harm individual rearing juvenile steelhead trout and coho salmon by concentrating or stranding them in residual wetted areas before they are relocated. Juvenile salmonids that avoid capture in the project work area will likely die during dewatering activities due to desiccation or thermal stress. Because the pre-dewatering fish relocation efforts will be performed by qualified biologists, NMFS expects that the number of juvenile steelhead trout and coho salmon that will be killed as a result of stranding during dewatering activities will be very small, likely one percent of salmonids within the worksite dewatering (Table 5).

Dewatering operations may affect benthic (bottom dwelling) aquatic macroinvertebrates; an important food source for salmonids. Benthic aquatic macroinvertebrates within the project site may be killed or their abundance reduced when creek habitat is dewatered (Cushman 1985). However, effects to aquatic macroinvertebrates resulting from stream flow diversions and dewatering will be temporary because construction activities will be relatively short lived and the dewatered reach will not exceed 750 linear feet for any single project. Rapid recolonization (typically one to two months) of disturbed areas by macroinvertebrates is expected following rewatering (Cushman 1985, Thomas 1985, Harvey 1986). In addition, the effect of macroinvertebrate loss on juvenile salmonids is likely to be negligible because food from upstream sources (via drift) would be available downstream of the dewatered areas since stream flow, if present, will be bypassed around the project work site. Based on the foregoing, steelhead trout and coho salmon are not anticipated to be exposed to a reduction in food sources from the minor and temporary reduction in aquatic macroinvertebrates as a result of dewatering activities.

Beyond the dewatered area, the temporary cofferdams in the action area are not expected to impact juvenile steelhead trout and coho salmon movements beyond that caused by typical summer low flow conditions. Diversion dams could restrict movement of listed species in a manner similar to the normal seasonal isolation of pools by intermittent flow conditions that typically occur during summer within a portion of some streams through the range of CCC steelhead trout and CCC coho salmon, including creeks within the Program Maintenance Area. Because the quality of habitat in and around the action area is adequate to support rearing salmonids, NMFS expects these salmonids will be able to find food and cover up- or downstream of the project area as needed during dewatering activities.

2.5.1.3 Altered Channel Morphology

Covered activities may include altering the channel morphology and hydrology of a stream reach in order to stabilize banks, protect infrastructure, or maintain flood conveyance capacity. Project construction may have temporary or permanent effects on channel morphology and hydrology.

Projects, such as sediment removal, storm debris removal, and dewatering will result in temporary changes to channel morphology and hydrology. Habitat impacts associated with these types of projects are expected to be minor and hydrologic conditions are expected to revert back to pre-project conditions shortly after construction is complete. AMMs will be applied at every stage to reduce project impacts to channel morphology and hydrology and eliminate adverse effects to salmonids and habitat. Alterations to stream contours and slopes will be limited to the extent feasible. Only work necessary to maintain the channel for the purpose for which it was intended will be conducted in a given stream reach, meaning storm debris and sediment removal will be

limited to the minimum necessary to maintain channel function. Because of these measures, NMFS expects the impacts of temporary changes to channel morphology and hydrology on salmonid critical habitat to be negligible.

Projects involving bank stabilization and in-channel construction, such as culvert installation, will result in permanent alteration of channel morphology and hydrology. Culverts constrict the channel and increase flow velocity, causing scour and bank degradation downstream. Constricting a natural channel puts a stream into a state of disequilibrium; scour and bank degradation will increase downstream until the system reaches a new state of equilibrium (Henderson 1986; Simon and Johnson 1999). Where channel width is reduced, water velocity will increase and cause corresponding increases in shear stress and degradation along stream banks (Simon and Johnson 1999). Over time, this mechanism widens the stream channel to accommodate the new flow regime, if left unchecked. More typically, this process is halted by stabilizing stream banks with rock or organic materials, thereby preventing bank degradation. The purpose of bank stabilization projects is to constrict stream channels, preventing lateral channel movement and, often, damage to adjacent property or infrastructure. As before, this constriction leads to higher flow velocities, increased scour, and downstream bank degradation in addition to channel incision within the constricted reach. Thus, not only does bank stabilization and in-channel construction alter hydrologic and geomorphic processes, but the impacts of these projects can propagate both upstream and downstream of the project site. Channels modified with hard materials create relatively simple and homogenous habitats that are less suitable for rearing salmonids (Schmetterling at al. 2001; Fischenich 2003; Hellmair et al. 2018). These projects have the potential to not only impact critical habitat on the scale of n of stream channels can adversely modify critical habitat and preclude recovery. The project and Program limitations, along with AMMs, are intended to limit the above impacts. Bank stabilization projects will incorporate bioengineered elements to the extent feasible in an effort to dissipate flow and create complex habitat. Hard materials used in bank stabilization projects will be limited to 1 site per year that is no longer than 150 linear feet and with the toe of the slope incorporating habitat features such as boulders and rootwads. Furthermore, bank stabilization projects should be separated by at least 1,500 stream feet to prevent multiple projects from armoring long lengths of channel. Similarly, culvert projects will be designed to follow the natural stream grade and will be sized for the 100-year storm event if necessary. One repaired or replaced culvert per year that involves fish passage is expected to be included in the Program with prior approval and review from NMFS. No stream crossing culverts that maintain a fish passage impediment will be covered for repair or replacement under this Program. Because some of the repaired or replaced culverts may currently be a passage impediment, this activity is expected to benefit salmonids. Additional AMMs provide consideration of project impacts upstream and downstream of the project site in an effort to eliminate the potential for these impacts to spread and further modify critical habitat. NMFS expects these measures to substantially reduce the potential for bank stabilization and in-channel construction projects to impact salmonid critical habitat on the scale of both individual projects and multiple projects across the action area over the five-year term of the RGP. Thus, NMFS does not expect altered channel morphology and hydrology to reach a scale where PBFs of critical habitat will be diminished.

2.5.1.4 Effects of Riparian Vegetation Removal

Projects covered under the Program will result in temporary reductions in riparian vegetation due to the removal and trimming of vegetation to facilitate work site access, complete construction and maintain proper operation of County facilities. Riparian vegetation provides stream shading, which contributes to maintaining suitable stream temperatures and provides instream cover for salmonids. Trees can be a source of large woody debris and contribute to stream complexity when trunks, branches, and roots extend into the wetted perimeter of the channel. Loss of riparian vegetative cover can contribute to increases in stream temperature and the loss of organic matter that contributes to the aquatic food web. This organic matter contributes to the aquatic productivity of the stream, fish prey organisms, and PCEs of salmonid and green sturgeon critical habitat.

Within portions of anadromous salmonid streams, the County proposes to selectively remove aquatic and riparian vegetation by hand or mechanical labor and herbicide application in and adjacent to creek corridors. Along both freshwater and tidally-influenced reaches, vegetation management would be performed along portions of stream channels to restore the designed hydraulic capacity of the channel, as determined by the relevant maintenance guidelines.

Trimmed vegetation is expected to grow back and post-construction replanting will restore the temporarily lost riparian function within one to two years following construction. AMMs applied to all stages of project planning, implementation, and site restoration is expected to substantially reduce the impact of riparian vegetation removal on salmonid critical habitat. Aquatic and riparian vegetation removal will be avoided if feasible; otherwise it will be limited to the minimum necessary to complete the work. Stump and rootwads will remain in place and use of heavy equipment avoided whenever feasible to maintain bank stability. All soils disturbed during construction will be replanted with native vegetation and woody material will be retained in streams not managed for flood control. Project sites will be monitored following construction to ensure the success of revegetation efforts. Because of these measures, the effects of temporary riparian disturbance on salmonid critical habitat at individual project sites will likely be negligible.

The aggregate impacts on ecosystem function of multiple projects over the five-year term of the Program across the Program Maintenance Area is of greater concern. The spatial clustering of projects involving riparian vegetation removal has the potential to impact salmonid critical habitat by reducing habitat complexity and increasing stream temperature. The project limitations in Section 1.3.2 place limits on the size and number of projects that may entail vegetation removal. The County will remove no more than two non-hazardous riparian trees per year under this program if the tree is affecting conveyance capacity or is blocking access to a construction site. These ten trees that may be removed under the Program over the five years will be mitigated for with in kind riparian replacement trees. Projects that may require high amounts of vegetation removal, such as culvert installations, sediment removal, and bank stabilization, may also require dewatering. The Program has restrictions in place to address some of these concerns. Dewatering on streams that have documented presence of CCC coho salmon within the last five years will not occur. This will help minimize the potential of exposure to this endangered species of temporary channel degradation due to construction activities requiring vegetation removal. Bank stabilization, culvert repair and replacement and sediment removal projects are all subject to project and

Program limitations described in Table 3. This will help prevent large areas in a stream from bank armoring and riparian vegetation removal under single or multiple projects. AMM and BMPs require trees, shrubs, and groundcover be retained whenever possible and that all disturbed lands be revegetated with native or non-invasive plants following project construction. Mandatory revegetation of disturbed habitat will ensure that the loss of vegetation is temporary and habitat function will be recovered within one to two years. These Program measures are expected to substantially reduce the potential for the additive impacts of multiple projects across the Program Maintenance Area and the five-year term of the Program to adversely impact listed fish and their critical habitat. Thus, NMFS does not expect temporary riparian vegetation removal to reach a scale where the fitness of salmonids will be reduced or PBFs of critical habitat will be diminished.

2.5.1.5 Effect of Hazard Tree and LWD Removal

Large wood in the stream channel is an integral part of freshwater salmonid habitat. LWD provides cover for adult and juvenile salmonids, assists with the formation of pools and other habitat features, provides variability in flow velocity and depth, and it is particularly important as over-wintering habitat for juvenile salmonids (Keller and MacDonald 1983). The Programs hazard tree removal program has the potential to further degrade habitat conditions for salmonids by removal of LWD from streams in the Program Maintenance Area. However, to avoid and minimize the impacts of removing LWD from streams in the action area, the Program has protocols for retaining as much woody debris in the channel as possible including repositioning or modifying the LWD within the channel. To the extent feasible, redwood and Douglas-fir trees fallen from County property will be protected and retrieved for use in bank stabilization and/or habitat enhancement projects if they cannot be utilized on site.

The Programs LWD program is unlikely to retain existing levels of LWD in the action area and is expected to result in adverse effects to salmonid habitat, including designated critical habitat. Modifications to LWD in the form of relocating or reducing the size of a log or branch would typically result in a piece of wood that is more likely to be transported downstream and lost from the river system. Large pieces of wood tend to become lodged in the stream bed or bank more readily than smaller pieces. Therefore, large pieces of LWD are less likely to be transported downstream in high flow events. Larger pieces of wood are also more effective at retention of coarse sediments, and provide larger habitat complexity features that can be used by both adult and juvenile salmonids. By modifying the LWD in a manner to eliminate the hazardous condition, the Program likely contributes to a higher rate of loss of LWD from streams in the Program Maintenance Area. This loss of LWD contributes to the degradation of rearing and spawning habitat PCEs of designated critical habitat for CCC coho salmon and CCC steelhead trout. The magnitude of the impact to LWD by the Program is ameliorated in part by the mitigation program. If LWD removed from one site is placed in an appropriate off-site location within the same watershed, the relocated LWD could enhance areas where existing habitat complexity is low. Additionally, the Program has the ability to anchor LWD in place which can create a permanent habitat benefit. Because wood removal and replacement will likely only occur at a limited number of sites during one year, and emphasis will be to leave downed tree in place in part or whole where possible, the overall impacts in each watershed would likely be small.

2.5.1.6 Loss of Benthic Habitat

Construction activities in the action area will result in temporary and permanent losses of benthic habitat. Permanent losses will result from projects involving construction of permanent in-channel structures from bank stabilization and culvert replacement and temporary losses will result from projects requiring dewatering and sediment removal. Work site isolation and dewatering will result in temporary degradation of critical habitat PBFs and the temporary reduction in food resources available to rearing listed fish. Benthic (bottom dwelling) aquatic macroinvertebrates are an important food source for salmonids and sturgeon; they may be killed, or their abundance reduced when stream habitat is dewatered (Cushman 1985). However, effects to aquatic macroinvertebrates resulting from stream flow diversions and dewatering will be temporary because construction activities will be relatively short-lived. Recolonization of rewetted stream reaches occurs via drift from upstream reaches as well as from macroinvertebrates that were dormant during stream drying (Dostine et al. 1997; Fritz and Dodds 2004). The speed of recolonization following stream drying is a function of distance from upstream refugia and the amount of time a reach was dry (Dostine et al. 1997; Fritz and Dodds 2004). Rewetted reaches will be recolonized more rapidly if they are proximate to stream reaches that did not undergo drying, sometimes within days of rewetting (Miller and Golladay 1996). Since the stream reaches immediately upstream and downstream of dewatered reaches will remain wetted, NMFS expects that macroinvertebrate recolonization of dewatered stream reaches will occur rapidly (within several months) following rewetting.

The Program will implement several measures to reduce impacts to salmonids and critical habitat from dewatering activities. Sturgeon and their critical habitat are not expected to be affected by dewatering in the Program Maintenance Area. Dewatering will not occur in streams where CCC coho salmon have been documented within the past five years. Dewatering activities will be limited to a maximum of 750 linear feet per project and 12,500 linear feet over the 5-year term of the Program. Simultaneous dewatering activities within the same stream reach are not expected to occur. Densities of CCC steelhead and CCC coho are expected to be low across the Program Maintenance Area and NMFS expects fish will be able to access sufficient food resources in adjacent habitats as well as from upstream sources provided (via drift) from streamflow diverted around the project work site. Thus, NMFS expects the effect of dewatering and work site isolation on juvenile salmonids is likely to be negligible because fish will be able to find sufficient food and cover outside of the project area as needed to maintain their fitness during project construction. Since the stream reaches immediately upstream and downstream of dewatered reaches will remain wetted, NMFS expects that macroinvertebrate recolonization of dewatered stream reaches will occur rapidly following rewetting. Furthermore, NMFS expects the function of critical habitat will return to pre-project levels before adults and smolts use the action area for migration. Based on the above, the temporary impacts of dewatering projects on the salmonid critical habitat PBFs is expected to be negligible.

Projects that involve the construction of permanent in-channel structures, such as bridges and culverts, will result in the permanent loss of benthic habitat. This will result in the permanent reduction in benthic habitat available for macroinvertebrate production and therefore salmonid foraging. Since this is a maintenance program, it should not incur loss of benthic habitat in any meaningful way above baseline conditions. Bridge maintenance work is limited to repairs and erosion control at abutments and no net increase of in-water structures should occur. Benthic habitat may potentially be lost from replacement of undersized culverts with those meeting the 100

year flood design. However, those culverts that cross streams are limited to one per year at maximum length of 100 feet (500 SF) and will be designed to improve fish passage so should result in a net benefit. The loss of benthic habitat associated with in-stream construction projects is typically very small, usually representing a fraction of the total project acreage. With Project, annual and Program limits on in-channel structures, NMFS believes this reduction in benthic habitat and macroinvertebrate production will likely have a negligible effect on salmonids and their critical habitat.

Bank stabilization projects result in the permanent alteration of benthic habitats. Projects utilizing rip rap to stabilize banks and channelize streams create deep, homogenous channels with limited macroinvertebrate production and poor habitat quality for rearing salmonids (Sudduth and Meyer 2006; Hellmair et al. 2018). Within these reaches, juvenile salmonid habitat use can be over three times lower and the potential for predation by invasive smallmouth bass (*Micropterus dolomieu*) much higher compared to other habitat types (Hellmair et al. 2018). Projects using bioengineered elements, such as root wads, large wood, boulders, and submerged vegetation, can increase the diversity and abundance of benthic macroinvertebrates available for forage as well as increase habitat heterogeneity and cover for rearing salmonids (Sudduth and Meyer 2006; Hellmair et al. 2018). Although salmonid abundance is consistently higher in unmodified streams, abundance in modified reaches with bioengineered elements is also consistently higher than in homogenous reaches of rock rip rap (Hellmair et al. 2018).

The Program will include bioengineered elements in all bank stabilization designs where possible and to the maximum extent feasible to minimize the potential for bank stabilization projects to have deleterious effects on listed salmonids. Bank stabilization projects will be limited to those immediately threatening critical infrastructure and/or repair of existing riprap. The use of hardscape will be limited to one project per year of 150 linear feet exceeding no more than 750 feet of the total Program's bank stabilization limits (3,750 feet) (Table 3). Additionally, if hardscape is to be used, it would typically be installed above the ordinary high water mark and fronted by vegetated boulder revetments or habitat features at the toe of the slope. Given the large scope of the Program Maintenance Area and relatively low salmonid densities throughout the area, the addition of hardscape of this magnitude will not reduce available benthic habitat to such an extent that it will negatively impact salmonid foraging or critical habitat. Therefore, NMFS does not expect bank stabilizations to result in reductions of benthic habitat that alter individual salmonid fitness or changes to the ability of PBFs to support the value of critical habitat in the action area.

2.5.1.7 Effects of Pruning and Herbicide Use.

Loss of riparian and aquatic vegetation from salmonid streams can result in the adverse effects described above. However, the Programs proposed vegetation management program is not expected to result in significant adverse effects due to careful application of removal methods and selective management techniques. For water bodies, herbicide use is limited to control non-native plant species where excess vegetation is determined to be the cause of sediment deposition and/or debris accumulations that result in flooding or damage to public facilities. Pruning activities are expected to result a low level of disturbance of soil and sediment due to the extensive use of hand tools performing these activities.

Vegetation management with the application of herbicides has the potential to directly affect salmonids and sturgeon from exposure, and affect critical habitat from changes in primary and secondary productivity within the action area. As of 2010, the County departments operate within the framework of the Integrated Pest Management (IPM) Policy (Resolution No. 070851) which emphasizes applying non-pesticide alternatives on County owned or managed land where feasible and, applying the least toxic pesticides to the maximum extent practicable. To minimize potential adverse effects due to exposure and changes in aquatic productivity, the County proposes to use only herbicide formulations in stream channels that are approved for aquatic environments (*e.g.,* Clearcast®, Roundup Custom® Rodeo®) and adhere to all state and federal regulations concerning herbicide use. Herbicide application is only conducted when the climate is dry and when wind speeds do not exceed 7 miles per hour. Herbicides are not used in or adjacent to any fish-bearing stream, lake, pond or other water bodies known to support California red-legged frog. Application methods will be limited to a hose, hand gun, or backpack unit for target spraying.

Glyphosate, the main active ingredient in Roundup®, is highly soluble in water. Studies conducted in a forest ecosystem (Feng et al. 1990; Goldsbourough et al. 1993; Newton et al. 1994) found that glyphosate dissipated from streams within 3-14 days. For all aquatic systems, sediment appears to be the major sink for glyphosate residue. Glyphosate binds to many soil types and clay materials; therefore it is highly immobile in soils and rendered inactive in a period of weeks (Norris et al. 1991). Glyphosate can leach from soils into groundwater when soils particles are washed into streams and rivers. The primary mode of action targets plant cell walls. The County proposes to use glyphosate in the form of Rodeo®, and Roundup Custom® for targeted treatment of in-channel vegetation. Application is species dependent but likely occurs from late spring to early fall, but primarily would occur during summer months using a backpack or hand held sprayer when wind speeds are low. These methods of sprayer application are anticipated to result in low volumes of glyphosate being applied to vegetation and soils. If glyphosate does reach streams, it would rapidly dissipate from the water column into the sediment. For these reasons, salmonids would, if at all, be exposed to glyphosate at very low concentrations for short-durations following applications. Imazamox formulations (Clearcast®) are effective in controlling floating, emergent, and submersed aquatic weed species (*e.g.,* cattails or other invasive weed species) as well as thistles, brush, and vines. Imazamox belongs to the imidazolinone class of pesticides. Their mode of action is to inhibit acetohydroxyacid synthesis, an enzyme involved with the biosynthesis of the amino acids leucine, isoleucine, and valine. Animals do not synthesize these amino acids via this pathway, so imidazolinone herbicides generally exhibit very little toxicity to animals, birds, fish, or insects. They are potent herbicides however, and if not used carefully, they can be harmful to non-target plants adjacent to treated fields. In five field dissipation studies on various soil types, imazamox dissipated with half-lives ranging from 35 to 118 days; the geometric mean being 59 days. In water, the photolytic half-life was found to be 6.8 hours (0.23 days) (WDNR 2012). If not degraded photolytically, imazamox is very stable and persistent in aquatic sediments where there is deep, poorly-oxygenated water with no light, with a half-life of approximately 2 years. Imazamox is rated practically non-toxic to fish and aquatic invertebrates. Laboratory tests using rainbow trout, bluegill, and water fleas (Daphnia magna) indicate that imazamox is not toxic to these species at label application rates. Imazamox does not bioaccumulate in fish (WDNR 2012).

Based on the application methods and other BMPs proposed by the Program for in-channel vegetation management, the risk of herbicides entering the wetted areas of creeks with salmonids

and sturgeon is low. Further, the exposure levels to be expected under application in aquatic habitats by the County are unlikely to be sufficient to cause adverse effects to salmonids, or their designated critical habitat because the herbicide concentrations used are small and directly applied to target invasive vegetation with herbicides known to have low to no toxicity to fish. Since glyphosate and imazozmox are considered relatively non-toxic to fish and do not bioaccumulate in the tissues of aquatic organisms, NMFS does not expect any salmonid mortality, changes in growth rates, reduction of reproductive success or detectable effects on designated critical habitat in the action area associated with the application of glyphosate or imazamox.

The other vegetation management activities undertaken in the Program include fire break management, grazing and burn piles. Neither of these activities will be conducted near bodies of water and therefore effects from these actions on listed fish are discountable.

2.5.1.8 Temporary Increases in Suspended Sediments

Certain maintenance activities included in the Program have the potential to increase suspended sediment concentrations and turbidity in streams. Increases in sediment may affect salmonids and critical habitat in a variety of ways. High concentrations of suspended sediment can disrupt normal feeding behavior and efficiency (Cordone 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 sediment concentrations can reduce dissolved oxygen in the water column, resulting in impaired respiration, repressed immune response, and 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 form established territories (Waters 1995), which can displace fish into less suitable habitat and/or increase competition and predation, decreasing survival as a result. Increased sediment deposition can fill pools, thereby reducing available cover and habitat, and smother coarse substrate particles, which can cause a shift in macroinvertebrate composition and abundance (Sigler et al. 1984; Alexander and Hansen 1986). Sedimentation leads to increased substrate embeddedness and a reduction in the depth, volume, and frequency of pools (Sigler et al. 1984). The overall effect is a substantial reduction in the quality and extent of spawning gravels and deep-water refugia for adults and reduced survival of eggs and alevin (Meehan 1991).

Construction activities within the Program Maintenance Area that may result in the disturbance of the stream bed and banks include equipment access, placement and removal of bank stabilization materials, stream diversion structures, or sediment removal. Disturbed soils may become mobilized when work sites are rewetted following construction and during subsequent high flow events. NMFS anticipates these activities would affect water quality and critical habitat in the vicinity of the work site in the form of small, short-term increases in turbidity during rewetting and subsequent higher flow events during the first storms post-construction. 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). Although chronic elevated sediment and turbidity levels may affect salmonids and critical habitat, the temporary increases in sedimentation and turbidity resulting from the projects included in this Program are not expected to rise to levels sufficiently high enough to adversely affect salmonids or critical habitat. Sedimentation and turbidity are most likely to increase during construction and removal of water

diversion structures as well as during post-construction rewetting of the channel. The application of AMMs to all aspects of project planning, implementation, and cleanup is expected to substantially reduce or eliminate the impacts of sedimentation and turbidity on salmonids and critical habitat. Working in dry streams when possible will eliminate short-term impacts to aquatic vertebrates. When working in dry streams is not feasible, limiting the work window to June 15 to October 15 will limit any impacts to juvenile life stages. There are a suite of BMPs specifically aimed at reducing erosion and scour in storage and staging areas, riparian areas, and water diversions (Appendix A). Additionally, several of the maintenance activities will result in reduction of acute or chronic sedimentation into the streams through culvert repair, bank stabilization in eroded areas and maintenance of roadside ditch, swale and green infrastructures. With the implementation of these BMPs, in addition to the project limitations and AMMS established in Section 1.3.2, NMFS anticipates that any elevated turbidity levels would be small, temporary, and well below levels and durations shown to impact salmonids and sturgeon or critical habitat. NMFS expects any sediment or turbidity generated by the projects covered under the Program would not extend more than 100 feet downstream of work sites, based on the methods used to control sedimentation and turbidity. NMFS does not expect the temporary, slight increase in suspended sediment concentrations in 100 feet of channel downstream of work sites will reach the scale where salmonid fitness or PBFs of critical habitat will be significantly affected.

2.5.1.9 Effects on Water Quality from Hazardous Material, Contaminants and Debris

Some projects will involve the use of hazardous materials with the potential to adversely affect salmonids and their critical habitat. Covered activities that involve construction or maintenance operations in, over, and near surface waters have the potential to release debris, hydrocarbons, concrete, and similar contaminants into surface waters. Potentially hazardous materials include wet and dry concrete debris, wood preservatives, fuels, herbicides and lubricants. Construction equipment and materials will be used on site and stored in adjacent staging areas. Spills, discharges, and leaks of these materials can enter streams directly or via runoff. If introduced into streams, these materials could impair water quality by altering the pH, reducing oxygen concentrations as the debris decompose, or by introducing toxic chemicals such as hydrocarbons or metals into aquatic habitat. Oils and similar substances form construction equipment can contain a wide variety of polynuclear hydrocarbons (PAHs) and metals. PAHs can alter salmonid egg hatching rates and reduce egg survival as well as harm the benthic organisms that are a salmonid food source (Eisler 2000). Construction materials, such as asphalt and concrete, commonly used on roads and bridges may also fall into streams directly during construction activities. Disturbance of stream beds by heavy equipment or construction activities can also cause the resuspension and mobilization of contaminated stream sediment with absorbed metals.

These effects have the potential to harm exposed fish and temporarily degrade habitat. However, AMMs and BMPs applied at all stages of project planning, implementation, and cleanup will substantially reduce or eliminate the potential for construction material and debris to enter waterways. Limiting the work window to the dry season from June 15 to October 15 will limit hazardous material exposure to juvenile salmonids and eliminate potential for contaminants to adversely affect the most sensitive life stages. There are several BMPs including in the Program to prevent spills, store and inspect equipment and materials and exclude contaminants from entering

water ways directly or through storm drains. Equipment will be checked daily to ensure proper operation and avoid any leaks or spills. Proper storage, treatment, and disposal of construction materials and discharge management is expected to substantially reduce or eliminate contaminants entering streams via runoff. Due to these measures, conveyance of toxic materials into active waters during project construction is not expected to occur and the potential for projects covered under this Program to degrade water quality and adversely affect salmonids or critical habitat is improbable.

2.6 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02 and 402.17(a)). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Urban development, including rural residential and agricultural development is likely to continue throughout San Mateo County as well as other non-Federal actions. NMFS assumes the rate of such development would be similar to that observed in the last decade. New regulations and increased awareness of the effects of urban and agricultural development on streams and water quality are expected to reduce the magnitude of these effects on salmonids and their critical habitat in the future. Non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the environmental baseline (Section 2.4).

2.7 Integration and Synthesis

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

2.7.1 CCC Coho Salmon ESU and CCC Steelhead Trout DPS

CCC coho salmon populations are doing poorly and remain at critically low levels, with those in the southern Santa Cruz Mountains strata likely extirpated and reliant on broodstock hatchery production. As described in *Status of the Species (Section 2.2),* CCC coho salmon populations remain, at best, a slight fraction of their recovery target levels, and the continued extirpation of dependent populations continues to threaten the ESU's future survival and recovery (NMFS 2016). Steelhead populations across the CCC DPSs have decreased substantially in abundance but are still fairly well distributed (Good et al. 2005; Williams et al. 2011). Abundance data for CCC steelhead has historically been severely limited, however, existing data suggest substantial reductions in

abundance and negative population trends across their range (Good et al. 2005). Status updates on CCC steelhead have concluded that they are likely to become endangered in the foreseeable future (Good et al. 2005).

Juvenile CCC coho salmon are expected to be present but rare on the Coastside and CCC steelhead trout are expected to be present in varying densities throughout the Program Maintenance Area during the five-year term of the Program. The Program Maintenance Area covers portions of the San Francisco Bay and Santa Cruz Mountain Diversity Stratums of coho salmon. It is believed that coho salmon have been extirpated on the Bayside of the Program Maintenance Area and coho salmon populations on the Coastside are likely the product of broodstock hatchery releases. Coho salmon populations within these rivers are severely depressed compared to historic conditions. CCC steelhead belong to the Santa Cruz Mountain Diversity and Coastal San Francisco Stratum. As detailed in the *Environmental Baseline (Section 2.4) and Status of Critical Habitat (Section 2.2)*, the depressed condition of the CCC coho ESU and CCC steelhead DPS is due in part to dams, water diversions, urban and agricultural runoff, urban and agricultural development, and loss of estuarine habitat. As described in the *Effects of the Action (Section 2.5),* The Program will mostly involve routine maintenance on structures and facilities that are already in place in the watershed. This will include additional bank stabilization projects to protect County roads and infrastructure. Although, this contributes further to altered channel morphology it will include habitat features that in some cases will result in an improvement for rearing or migratory conditions within the stream. It may reduce sedimentation into streams by restoring riparian habitat where it has degraded and/or remediating culvert failures that may cause erosion or block suitable habitat for salmonids. Of anticipated Program effects, only fish collection, relocation, and dewatering activities are likely to result in injury and mortality of juvenile salmonids. NMFS expects that presence of juvenile coho salmon at individual project locations to be exposed to these effects will be unlikely due AMMs that restrict dewatering activities in the streams where coho salmon have been recently observed or released under recovery programs. CCC steelhead juveniles may be exposed and injured or killed by dewatering activities. Anticipated mortality from relocation is expected to be approximately 2 percent of salmonids relocated and mortality from dewatering is expected to be approximately 1 percent of the salmonids in the area prior to dewatering. Given the large size of the action area, the number of salmonids present may vary greatly depending on the location, timing, and magnitude of the project. Available survey data suggests steelhead density ranges from 30 to 155 per 100 feet of stream throughout the Program Maintenance Area, depending on the stream. This means that 2 to 5 steelhead per 100 feet of stream will be harmed or killed during fish collection, relocation, and dewatering activities depending on the project location (Table 6 in Section 2.9.1 below). Any steelhead present would likely constitute a small proportion of the steelhead in the watersheds within the Program Maintenance Area. Given the impaired habitat and low abundances in the Program Maintenance Area, the presence of steelhead at or near the estimated abundances may suggest successful recruitment and higher overall abundances in the watersheds. Additionally, due to the relatively large number of juveniles produced by each spawning pair of adult steelhead, spawning in tributaries throughout the Program Maintenance Area in future years would be expected to produce enough juveniles to replace any juveniles that may be lost at project sites due to collection, relocation, and dewatering activities. This is especially true in light of ongoing restoration and remediation activities in San Mateo County. It is

unlikely that the small potential losses of juveniles resulting from covered activities would impact future adult returns. Limitations on project type, number, and magnitude will also limit injury and mortality of CCC steelhead trout or CCC coho salmon annually and over the five-year term of the Program.

In addition to the adverse effects discussed above, NMFS also considers the potential impacts of non-adverse impacts. The implementation of some routine maintenance activities and AMMs is expected to reduce or eliminate the potential of increased sediment and turbidity and reduced riparian habitat. In addition, limitations have been placed on the timing, spatial distribution, and magnitude of activities to further reduce the potential for adverse impacts. As a result, the potential for salmonids and habitat to be exposed to construction debris, hazardous materials, and contaminants is improbable. Similarly, temporary reductions in riparian habitat and temporary increases in suspended sediment concentrations will not reach levels that are harmful to salmonids. Altered channel morphology and hydrology has the potential to simplify stream habitats and directly lead to a reduction of habitat available to juvenile salmonids for rearing. AMMs and project limits on size, proximity, and project design will sufficiently reduce the magnitude of altered channel morphology and hydrology impacts to salmonids. Additionally, NMFS will provide technical assistance during project planning and design to further reduce the potential for adverse impacts to salmonids and their habitat. NMFS does not expect any of the aforementioned effects to occur simultaneously with other effects in any significant way. Therefore, neither the temporary effects expected from reduction in riparian vegetation, increased sediment and turbidity, nor the permanent effects of altered channel morphology and hydrology and reduction of benthic habitat are expected to affect CCC coho salmon and CCC steelhead trout in any significant way. No infrastructure that impedes passage to current or potential salmonid habitat will be included in the Program and stream crossing culverts that are repaired or replaced under the Program will meet NMFS requirements for fish passage. Thus, the number of seasonal and permanent barriers to fish movement within the action area will likely be reduced over the five-year term of the Program. Consequently, NMFS does not expect covered activities to adversely affect the persistence or recovery of CCC coho salmon or CCC steelhead trout.

Climate change could affect CCC coho salmon and CCC steelhead trout in the Program Maintenance Area (Section 2.2.3). The predicted increase in summer temperatures could lead to reduced growth rates and lower survival for stream-rearing juveniles. Similarly, lower precipitation could lead to reduced stream flows, increased stream drying, and less food availability via invertebrate drift. Given the impaired habitat conditions across much of the action area (*i.e.,* impaired water quality and low summer flows), NMFS does not expect conditions to worsen beyond those already occurring over the five year term of the Program. Short-term effects of climate change may exacerbate these conditions; however, the effects of climate change are not expected to significantly worsen existing conditions over the timeframe considered in this programmatic biological opinion. Considering the above, we do not expect climate change to affect CCC coho salmon or CCC steelhead trout in the action area beyond the scope considered in this programmatic biological opinion.

2.7.2 Critical Habitat for CCC Coho Salmon and CCC Steelhead Trout

Accessible habitat throughout both the CCC coho salmon and CCC steelhead DPS have been severely degraded and the condition of designated critical habitat has been degraded from conditions known to support viable populations (Section 2.4.3). Anthropogenic impacts have been identified as contributing to degradation of anadromous fish habitat including logging, agricultural development, urbanization, mining, stream channelization, dams, water diversions, and habitat loss. Urban and agricultural development encroach on riparian habitat and increase runoff that alters stream hydrology and increases pollution. Dams and water diversions block access to upstream habitat, alter streamflow, and reduce or eliminate large wood and gravel recruitment from upstream reaches. Stream channelization causes incised channels, eliminates floodplain connectivity, and creates a homogenous habitat that is substantially less productive and less suitable for salmonids. Several stakeholder groups have initiated restoration projects in small creeks as well as larger watershed projects that will enhance salmonid habitat in the future. Although data on how these measures are affecting listed species or habitat are lacking or not yet available, it is expected that improvements in habitat quality and access will result in long-term benefits to be realized in future cohorts by increasing access to suitable habitat and addressing some stressors that have persisted in the watershed.

In summary, factors responsible for the decline of CCC coho salmon and CCC steelhead trout and their critical habitat include: habitat alteration, water use, estuarine habitat loss, fishing harvest, artificial propagation, environmental variability, ocean conditions, reduced marine-derived nutrient transport, disease and predation, and global climate change. Effects of the Program on critical habitat will result from ground disturbing activities near stream channels. As described above, project site dewatering effects to CCC steelhead trout and CCC coho salmon critical habitat PBFs are expected to be temporary, insignificant, and will recover relatively quickly (one to two months) after the project site is rewatered. Similarly, for reasons described above for juvenile steelhead trout and coho salmon, short-term turbidity from elevated levels of suspended sediment may slightly degrade the value of critical habitat in the Program Maintenance Area, but only temporarily. Based on the size of the area disturbed and stream and bank substrate conditions, NMFS expects turbidity after rewatering the project site to last for only a few hours. Turbidity and sediment deposited downstream resulting from this project, are unlikely to significantly impact migration, spawning, or rearing PBFs in the Program Maintenance Area.

Streambank habitat degradation and long-term preclusion of natural fluvial and geomorphic processes resulting from bank stabilization is an adverse effect to CCC coho salmon and CCC steelhead trout critical habitat. Where existing geology and geomorphology allow, a stream channel will naturally meander, eroding laterally and creating a sinuous longitudinal course that dissipates its hydraulic energy and reduces stream gradient and erosive forces. For instance, specific to steelhead and salmon, a meandering unconstrained stream channel sorts and deposits gravel and other substrate types necessary for optimal food production and spawning success. These processes contribute to the maintenance of a healthy and diverse riparian corridor for fish that supplies LWD, and allows floodplain engagement during appropriate winter flows.

Bank stabilization can also propagate both up-and downstream of bank stabilization structures, meaning that bank stabilization projects often result in future bank stabilization projects in the same system. Multiple bank stabilization projects have the potential to not only impact critical habitat on the scale of individual projects, but taken together on the scale of a watershed, extensive constriction and armoring of stream channels can adversely modify critical habitat and preclude recovery.

The project and Program limitations, along with AMMs, are intended to limit these aggregate impacts to the extent possible. Program bank stabilization projects will incorporate bioengineered elements to the extent feasible in an effort to dissipate flow and create complex habitat. All bank stabilization projects under this Program will only protect existing critical infrastructure. Furthermore, bank stabilization projects will be separated by at least 1,500 stream feet to prevent multiple projects from armoring long lengths of channel. While NMFS expects these measures to substantially reduce the potential for projects to impact CCC coho salmon and CCC steelhead trout critical habitat within the Program Maintenance Area, the impacts will not be wholly avoided and ongoing channelization impacts on critical habitat function in the action area will result from the Program.

Climate change could affect habitat conditions in the Program Maintenance Area in the relatively near term, potentially within the time frame we are considering for this consultation. Ongoing anthropogenic impairments common throughout San Mateo County (*i.e.,* water diversions, dams, urban and agricultural runoff) are also likely to persist within this and longer timeframes. However, we do not expect conditions to worsen beyond those currently occurring in the action area and considered in this programmatic biological opinion. For example, extreme storms, higher average summer air temperatures, and lower total precipitation levels can already occur, potentially resulting in warmer stream temperatures and reduced stream flows in summer months. Similarly, anthropogenic impairments affecting recovery, such as water diversions and runoff from development, are already occurring. While short-term climate change effects could exacerbate these conditions, the effects of climate change are not expected to significantly worsen existing conditions over the timeframe considered in this programmatic biological opinion. Considering the above, we do not expect climate change to alter conditions in the action area beyond the scope considered in this opinion.

2.8 Conclusion

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

The amount or extent of take described below is based on the analysis of effects of the action done in the preceding biological opinion. If the action is implemented in a manner inconsistent with the Program description provided to NMFS, and as a result, take of listed species occurs, such take would not be exempt from section 9 of the ESA. In this programmatic biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows: Take of listed juvenile CCC coho salmon and juvenile CCC steelhead trout (*i.e.,* juvenile salmonids) may occur during fish collection, relocation, and dewatering activities. Fish collection, relocation, and dewatering will be conducted in a maximum reach length of 750 linear feet per project (Table 3). Juvenile coho salmon are unlikely to be affected by dewatering events as streams that have had recent observations of coho salmon (within the last five years) will not experience dewatering events under this Program, as stated in Section 1.3.2. However, since it is unknown where they may occur in the future, incidental take for juvenile coho salmon is included. Construction activities will largely be limited to the work window between June 15 and October 15. The number of CCC coho salmon and CCC steelhead trout that may be incidentally killed during project activities is expected to be small and limited to summer rearing juveniles. NMFS expects that no more than 2 percent of the juvenile salmonids within dewatered reaches will be injured or killed during fish collection and relocation activities. NMFS also expects that no more than 1 percent of the salmonids within the dewatered reaches will be injured or killed during dewatering activities.

The number of juvenile salmonids expected to be present at a given work site will vary depending on the location and size of the project. Where streams had available density observations for juvenile salmonids, they were used to determine the amount of incidental take. Therefore, the number of juvenile salmonids captured and the amount of incidental take allowed will differ with project location and size. Table 6 summarizes both the estimated number of juvenile salmonids present per 100 feet of channel and the amount of take allowed per 100 feet of channel. Included in the density estimate is a 25 percent increase to account for environmental variability in juvenile salmonid recruitment and habitat conditions. The 25 percent increase is based on NMFS’ best professional judgement as to the likely variability in salmonid densities over the five-year life of the Program. For projects listed in Table 6 exceeding 100 linear feet, these values may be used to calculate the number of juvenile salmonids expected to be present within the project site and the amount of take allowed. For projects taking place in streams not listed in Table 6, the density estimate for the closest, connected stream should be used. In situations where no watershed or stream juvenile salmonid data exists, take will be exceeded if more than 3 percent of captured salmonids are killed during fish collection, relocation and dewatering events.

Based on the Program limitations in Section 1.3.1.1, projects requiring dewatering will be limited to a total of 2,500 linear feet of channel per year and a total of 12,500 linear feet of channel over the five-year term of the Program (Table 3). Using the observed densities provided in Table 5 to derive estimated take in Table 6, NMFS estimates that up to 85 juvenile salmonids[5], with all likely being CCC steelhead juveniles (CCC coho juveniles unlikely to be encountered), may be injured or killed per year. Similarly, NMFS estimates that up to 415 juvenile salmonids[5], with all likely being CCC steelhead juveniles (CCC coho juveniles unlikely to be encountered), may be injured or killed over the five-year term of the Program. These estimates are based on dewatering activities taking place each and every year within these streams or watersheds at maximum allowable Program limits, which is extremely unlikely to occur. However, it does provide take levels when dewatering occurs within any one of these streams or watersheds. Additionally, these estimates do not take into account the numbers that may be injured or killed for streams that do not have density estimates.

Table 6. Estimated juvenile salmonid (j.sal) densities (from Section 2.4.2) and juvenile salmonid exceedance by stream.

Watershed	Stream	Estimated Density (#j.sal/100ft)	Estimated Steelhead Density with 25% increase	Collection/Relocation and Dewatering Mortality (allowed)
Coastside				
Gazos	Gazos Creek	24/100 ft.	30/100 ft.	2
San Gregorio	Mindego Creek	124/100 ft.	155/100 ft.	5
	Alpine Creek	73/100 ft.	91/100 ft.	4
Pilarcitos	Pilarcitos Creek	38/100 ft.	48/100 ft.	3
Bayside				
San Francisquito	Los Trancos Creek	46/100 ft.	58/100 ft.	3
San Mateo	San Mateo Creek	38/100 ft.	48/100 ft.	3
Other Watersheds	Incidental take will be estimated based on adherence to project and Program limits, AMMs and BMPs. Additionally, no more than 3percent mortality for total number of juvenile salmonids affected in dewatered reach from collection, relocation and dewatering.			

[5] 2500ft/600ft = 4.17 (4.17 six-hundred-foot dewatered segments per the annual 2,500 linear feet limit)
20 (total allowable injured or killed juvenile salmonids within a 600 foot segment of stream)*4.17 = 83.4 (per year) *5 (number of years in Program) = 417

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 coho and CCC steelhead:

1. Undertake measures to ensure that injury and mortality to salmonids resulting from fish collection, relocation, and dewatering activities is low.
2. Prepare and submit reports per the Program's Implementation Procedure (Section 1.4) to document the effects of construction, relocation, and dewatering activities as well as compensatory mitigation, monitoring activities and implementation of the program.
3. The repair or replacement of stream crossing culverts that maintain an existing salmonid passage barrier will not be covered under this Program.

2.9.4 Terms and Conditions

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

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

    a. County of San Mateo will retain NMFS approved biologists with expertise in anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid/habitat relationships; and biological monitoring of salmonids. To ensure that all biologists working on the project are qualified to conduct fish collections in a manner which minimizes all potential risks to salmonids. The Corps or the County of San Mateo will submit the resumes of candidate biologists to NMFS (Yvette Redler-Medina at yvette.redler-medina@noaa.gov) for review and approval prior to conducting the work. Electrofishing, if used, will be performed by a qualified biologist and conducted according to the NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act, June 2000. See: electro-fishing guidelines.

    b. The biologists will monitor the construction site during placement and removal of channel diversions to ensure that any adverse effects to salmonids are minimized.

The biologists will be on site during all dewatering events to capture, handle, and safely relocate coho salmon or steelhead trout. The Corps or the biologist will notify NMFS biologist Yvette Redler-Medina at yvette.redler-medina@noaa.gov, one week prior to capture activities in order to provide an opportunity for NMFS staff to observe the activities.

c. If coho salmon are identified during collection please notify NMFS biologist, Yvette Redler-Medina, by phone (text) immediately at (916) 317-1149 or the NMFS Central Coast Office (Santa Cruz, California) at 831 460-7564 and email at yvette.redler-medina@noaa.gov. Coho salmon and steelhead trout will be handled with extreme care and kept in water to the maximum extent possible during rescue activities. All captured fish will be kept in cool, shaded, aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream, and fish will not be removed from this water except when released. To avoid predation, the biologists will have at least two containers and segregate young-of-year fish from larger age-classes and other potential aquatic predators. Captured fish will be relocated, as soon as possible, to a suitable instream location in which suitable habitat conditions are present to allow for adequate survival of transported fish and fish already present.

d. If any salmonids are found dead or injured, the biological monitor will contact NMFS biologist, Yvette Redler-Medina, by phone (text) immediately at (916) 317-1149 or the NMFS Central Coast Office (Santa Cruz, California) at 831 460-7564. The purpose of the contact is to review the activities resulting in take, determine if additional protective measures are required, and to ensure appropriate collection and transfer of salmonid mortalities and tissue samples. All salmonid mortalities will be retained. Tissue samples are to be acquired from each salmonid mortality per the methods identified in the NMFS Southwest Fisheries Science Center Genetic Repository protocols (contact the above NMFS staff for directions) and sent to: NOAA Coastal California Genetic Repository; Southwest Fisheries Science Center; 110 McAllister Way; Santa Cruz, California, 95060.

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

a. Post-Construction Vegetation Monitoring and Reporting - Reports documenting post-project conditions of vegetation installed at the site will be prepared and submitted annually for the first three years following project completion, unless the site is documented to be performing poorly, then monitoring requirements will be extended. Reports will document vegetation health and survivorship and percent cover, natural recruitment of native vegetation (if any), and any maintenance or replanting needs. Photographs must be included. If poor establishment is documented, the report must include recommendations to address the source of the performance problems.

b. Fill material for cofferdams/in-stream diversions will be fully confined with the use of plastic sheeting, sandbags, or with other non-porous containment methods, such that sediment does not come in contact with stream flow or in direct contact with the natural streambed. All loose fill material for cofferdams or access ramps will be completely removed from the channel by October 31.

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

d. Equipment will be fueled and maintained at least 60 feet from the river and away from any storm water or drainage courses and equipment will be checked for leaks prior to in-channel work each day. If leaks occur during work in the channel (top of bank to top of bank), the County or their contractor will contain the spill and remove the affected soils.

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

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

a. As stated in the Program description, any culvert that crosses a salmonid bearing stream will be reviewed and approved by NMFS for fish passage prior to inclusion into this Program.

b. Any stream or road crossing culvert that is not in a "salmonid bearing" stream as designated by the County, will need to be reviewed by NMFS with details on exact location and rationale for why the stream is not accessible to listed salmonids. This can occur in the annual notification process.

c. If NMFS determines that the stream is not accessible to listed salmonids due to County infrastructure at the maintenance site or below that site, it may not be eligible for inclusion in this Program if project activities maintain a fish passage barrier. NMFS must consider current excluded habitat in potential recovery for listed salmonids and may exclude projects from a programmatic that prohibit recovery.

d. If passage impediments to salmonid migration at stream or road crossings are repaired or replaced in kind that are not consistent with the NMFS' Guidelines for Salmonid Passage at Stream Crossings (May 2000) during channel maintenance activities, and remain during smolt or adult migration seasons, take may be exceeded.

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).

2.11 Reinitiation of Consultation

This concludes formal consultation for the County of San Mateo RGP.

As 50 CFR 402.16 states, reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

2.12 "Not Likely to Adversely Affect"' Determinations

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR 402.02). In our analysis, which describes the effects of the proposed action, we considered 50 CFR 402.17(a) and (b). When evaluating whether the proposed action is not likely to adversely affect listed species or critical habitat, NMFS considers whether the effects are expected to be completely beneficial, insignificant, or discountable. Completely beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.

NMFS does not anticipate the proposed action will adversely affect:

North American green sturgeon southern DPS (*Acipenser medirostris*)
threatened (71 FR 17757; April 7, 2006)
critical habitat (74 FR 52300; October 9, 2009).

Green sturgeon are anadromous, long-lived, and bottom-oriented fish species in the family *Acipenseridae*. Adult green sturgeon may exceed two meters in length and 100 kilograms in weight (Moyle 2002). Southern DPS green sturgeon spawn over cobbles and large gravels in a small portion of Sacramento River during the spring and early summer months. Juvenile green sturgeon spend their first few years in the Delta and San Francisco estuary before entering the marine environment as subadults. Green sturgeon feed on benthic invertebrates and fish (Adams et al. 2002).

The effects of the proposed action includes collection and relocation of salmonids associated with dewatering, bank stabilization, culvert repair and replacement, vegetation management, and disturbance of benthic habitat and degradation of water quality. These actions will largely occur in areas of the Program where green sturgeon do not exist. However, the tidal portion of the action area is accessible to adult and juvenile green sturgeon year-round, green sturgeon are extremely unlikely to be present or disturbed by any of the Program activities described.

The Programs potential effects on water quality are described in Sections 2.5.1.7 through 2.5.1.9 Short-term increases in turbidity are expected during proposed dewatering activities, sediment removal, construction and removal of cofferdams, however, these activities are expected to occur upstream from tidal areas where green sturgeon presence is extremely unlikely. Maintenance activities where green sturgeon may occasionally be present at the Coyote Point Marina or near the San Bruno tidal gate are minor and should not affect green sturgeon or their critical habitat in any significant way. Maintenance activities in Coyote Point Marina are limited to minor dock repairs, water and sewer line inspection and cleaning, pile wrap repairs, repair of markers or changing light bulbs, depth soundings, and re-rocking the berm along the shoreline where rocks have fallen or sloughed away in order to prevent and minimize erosion. Program activities at the San Bruno tidal gate include trash or debris removal, flap gate painting and/or repair as necessary. No dredging or pile installation will be included in this Program. Therefore, water quality effects are limited to accidental spills and temporary turbidity from some maintenance activities. In consideration of the life history of green sturgeon, this benthic species is well adapted to living in estuaries with a fine sediment bottom and is tolerant of high levels of turbidity. Furthermore, increased levels of suspended sediment and turbidity during Program activities are anticipated to be minor, localized, and short-term. With tidal circulation in the action area, any elevated levels of suspended sediment or turbidity are anticipated to rapidly return to background levels after work ceases. Green sturgeon are tolerant of levels of turbidity that exceed levels expected to result from this Program's construction activities. Regarding the potential discharge of contaminants, proposed BMPs and AMMS before, during and after maintenance activities are anticipated to be sufficient to prevent or contain accidental spills to levels which are not likely to adversely affect green sturgeon or their critical habitat. Based on the above, effects to green sturgeon associated with impacts on water quality from Program activities are expected to be insignificant or discountable.

The action area is located within designated critical habitat for the Southern DPS of green sturgeon. The PBFs essential for the conservation of green sturgeon in estuarine areas include food resources, water flow, water quality, migratory corridor, water depth, and sediment quality. As described above in the biological opinion, Program maintenance activities may affect water quality and increase suspended sediment through some construction activities. Benthic habitat in the tidal areas of some streams and in Coyote Point Marina may provide foraging opportunities for green sturgeon, providing a substrate for infaunal and bottom-dwelling organisms, such as polychaete worms, crustaceans, and other potential prey items. However, disturbance of benthic habitat from this Program will be mostly associated with riparian habitats. Green sturgeon are not likely to be near streams where bank stabilization or dewatering may occur and NMFS expects that effects on sturgeon are improbable. Where sturgeon are more likely to be present, the turbidity effects in tidal environments will be very localized and temporary. Layers of mud and silt will become deposited during subsequent tide cycles and organisms from neighboring substrate will recolonize the project

area, returning it to its previous condition. Additionally, Sturgeon are expected to occur in nearshore areas infrequently and in low numbers, if at all. Coyote Point Marina undergoes frequent disturbance due to maintenance activities and boats that disturb the water column and benthic substrate. Therefore, it is unlikely for juvenile, subadult, and non-spawning adult green sturgeon to be present during maintenance activities in this area, as these life stages of green sturgeon are more likely to be located in areas of the Bay that possess higher quality habitat and less frequent disturbance. Similarly, the probability of green sturgeon occurrence near the San Bruno Creek tide gate, where the creek is quite narrow, is very low. Thus, the potential effects of this Program on green sturgeon critical habitat are considered insignificant.

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

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

This analysis is based, in part, on the EFH assessment provided by the Corps and descriptions of EFH for Pacific Coast groundfish (Pacific Fishery Management Council [PFMC] 2005), coastal pelagic species (CPS) (PFMC 1998) and Pacific Coast salmon (PFMC 2014); contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

Effects of the proposed project will impact EFH for Pacific Coast Salmon (PFMC 2014).

3.2 Adverse Effects on Essential Fish Habitat

The potential adverse effects of the Program on EFH have been described in the preceding biological opinion and include temporary minor disturbances to the stream bed, bank, and flow from project site dewatering; temporary elevated turbidity levels from suspended sediment; streambank habitat degradation and preclusion of natural fluvial and geomorphic channel dynamics. As described in the biological opinion above, the project site dewatering and turbidity effects are anticipated to be temporary and minor due to the amount of area impacted relative to the total quantity of habitat available in the action area. However, the streambank habitat degradation and preclusion of natural fluvial and geomorphic channel dynamics will persist into the future.

3.3 Essential Fish Habitat Conservation Recommendations

Based on information developed in our effects analysis (see the preceding biological opinion), NMFS has determined that the proposed action would adversely affect EFH for various federally managed fish species within the Pacific Salmon FMP. Pursuant to section 305(b)(4)(a) of the MSA, NMFS offers the following EFH Conservation Recommendations to the Corps to avoid, minimize, or otherwise offset anticipated adverse effects to EFH.

NMFS recommends that the applicant provide status updates on current conditions for culverts in salmonid bearing streams within the Program Maintenance Area that were identified in a fish passage evaluation report (Taylor & Associates 2004). Several high priority sites identified impede access to salmonid habitat and should be prioritized for assessment. An update on which sites have been remediated and which remain a barrier would be important information for future restoration and recovery actions that may occur in the Program Maintenance Area. Culvert repair or replacement that improves fish passage should be prioritized, reviewed and approved under this Program.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, The Corps must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

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

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA

components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

a. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the Corps and County of San Mateo. Individual copies of this opinion were provided to the Corps. The format and naming adheres to conventional standards for style.

b. 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.

c. Objectivity

Information Product Category: Natural Resource Plan.

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

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

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

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

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6. APPENDIX A

BMP Number	BMP Title	BMP DESCRIPTION
General Avoidance and Minimization Measures		
GEN-1	Staging and Access	▪ Staging, access, and parking areas will be located outside of sensitive habitats to the extent feasible. ▪ Staging areas will be located 30 feet from the top of bank (or as far as feasibly possible) or on the outboard side of levees. ▪ Vegetation removal shall be limited to the minimum amount necessary to provide access.
GEN-2	Minimize Area of Disturbance and Site Maintenance	▪ Areas of disturbance will be limited to the smallest footprint necessary and a single access pathway, where feasible. For maintenance activities near waterways or other sensitive habitat, the designated work area shall be clearly identified in the field using highly visible material, and work will not be conducted outside thisarea. ▪ Keep excavated soil and materials on the site where they will not collect into the street or get transported to storm drains or nearby water bodies by rainfall or runoff in order to avoid deleterious effects to fish, wildlife, and beneficial uses. ▪ Transfer excavated materials to dump trucks on the site, not in the street.
GEN-3	Construction Entrances and Perimeter	▪ Establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from site and tracking off site. ▪ Sweep or vacuum any street tracking immediately and secure sediment source to prevent further tracking. Never hose down streets to clean up tracking. ▪ When in-channel work is required, where available use existing ingress or egress points or perform work from the top of the stream banks.
GEN-4	Salvage/Reuse of Plant and Woody Material	▪ Large wood or weed-free topsoil displaced by project activities may be stockpiled for use during site restoration. Native vegetation displaced by project activities will be stockpiled if it would be useful during site restoration. ▪ Stockpiled material shall not be placed over riparian or wetland vegetation. Stockpiled material shall not be placed in areas where it could enter the stream, riparian or wetland areas. ▪ To the extent feasible, all other woody material that is not re-usable should be disposed at a composting facility.
GEN-5	Non-Hazardous Materials	▪ Berm and cover stockpiles of sand, dirt or other construction material with tarps when rain is forecast or if not actively being used within 14 days.
GEN-6	Hazardous Materials Storage/ Disposal	▪ Label all hazardous materials and hazardous wastes (such as pesticides, paints, thinners, solvents, fuel, oil, and antifreeze) in accordance with city, county, state, and federal regulations. ▪ Store hazardous materials and wastes in watertight containers, store in appropriate secondary containment, and cover them at the end of every workday or during wet weather or when rain is forecast. ▪ Follow manufacturer's application instructions for hazardous materials and be careful not to use more than necessary. Do not apply chemicals outdoors when rain is forecast within 24 hours. ▪ Arrange for appropriate disposal of all hazardous wastes.

GEN-7	Spill Prevention and Control	▪ Keep spill cleanup materials (rags, absorbents, etc.) available at the construction site at all times. ▪ Inspect vehicles and equipment frequently for and repair leaks promptly. On-site monitor should insect beneath all vehicles that have been parked more than 15 minutes before they leave the work area. Use drip pans to catch leaks until repairs are made. ▪ Clean up spills or leaks immediately and dispose of cleanup materials properly. ▪ Do not hose down surfaces where fluids have spilled. Use dry cleanup methods (absorbent materials, cat litter, and/or rags). ▪ Sweep up spilled dry materials immediately. Do not try to wash them away with water or bury them. If water must be used, the Contractor shall collect the water and spilled fluids and dispose of it as hazardous waste. ▪ Clean up spills on dirt areas by digging up and properly disposing of contaminated soil. ▪ Small spills (less than 18 inches in diameter) including small quantities of oil, gasoline, paint or other materials should be controlled by the first responder (maintenance staff) and do not necessarily require an emergency response team. Medium spills (greater than 18 inches but less than 6 feet in diameter) are typically controlled by the first responder (maintenance staff) but police or fire department HAZMAT teams may be called based on conditions. Report significant spills (larger than 6 feet in diameter and any "running" spill) immediately. You are required by law to report all significant releases of hazardous materials, including oil. To report a spill, contact the San Mateo County Environmental Health Services Division, or other emergency office (e.g., local fire or police department) as warranted, immediately and document the spill using the spill documentation form. Alternatively, 1) dial 911, the local emergency response number; 2) the National Response Center at (800) 424-8802; or 3) call the Governor's Office of Emergency Services Warning Center, (800) 852-7550 (24 hours). As appropriate, contact other agencies including California Occupational Safety and Health Administration or the Regional Water Quality Control Board. All chemical spills shall be reported as soon as possible to the emergency site contact.
GEN-8	Waste Management	▪ Cover waste disposal containers securely at the end of every workday and during wet weather. ▪ Check waste disposal containers frequently for leaks and to make sure they are not overfilled. Never hose down a dumpster on the construction site. ▪ Ensure that portable toilets have a secondary containment plan (e.g., a containment pan). ▪ Clean or replace portable toilets and inspect them frequently for leaks and spills. ▪ Dispose of all wastes and debris properly. Recycle materials and wastes that can be recycled (such as asphalt, concrete, aggregate base materials, wood, gyp board, pipe, etc.). ▪ Dispose of liquid residues from paints, thinners, solvents, glues, and cleaning fluids as hazardous waste.
GEN-9	Vehicle Maintenance and Parking	▪ Designate an area, fitted with appropriate BMPs, for vehicle and equipment parking and storage. ▪ Perform major maintenance, repair jobs, and vehicle and equipment washing off site. ▪ Conduct vehicle and equipment cleaning at County corporation yards and ensure that rinse water does not run into gutters, streets, storm drains, or surface waters. ▪ If refueling or vehicle maintenance must be done on-site, work in a

		bermed area (e.g., sandbags, gravel bags, compost socks, or other barrier material) at least 150 feet away from creek channels, away from storm drains and over a drip pan big enough to collect fluids. ▪ Refuel vehicles at least 150 feet away from the active stream channel. ▪ Keep an ample supply of spill clean-up materials near fueling, vehicle maintenance and hazardous materials/hazardous waste storage areas. Inventory clean-up materials monthly and restock as needed. ▪ Post proper fueling and spill clean-up instructions at fueling areas. Never leave the area while equipment is being filled. ▪ Recycle or dispose of fluids as hazardous waste. ▪ Do not clean vehicle or equipment on-site using soaps, solvents, degreasers, steam cleaning equipment, etc. ▪ Perform vehicle and mobile equipment steam cleaning, pressure washing or degreasing only over a containment designed to collect any generated wash water. Collect wash water and discharge to sewer via an oil water separator. Do not pour wash water down storm drains or sewers connected to septic systems.
GEN -10	Equipment, Maintenance, and Fueling	▪ A separate area should be designated for equipment maintenance and fueling, away from any slopes, watercourses, or drainage facilities. ▪ Equipment should not be stored in areas that will potentially drain to watercourses or drainage facilities. If equipment must be stored in areas with the potential to generate runoff, drip pans, berms, gravel bags, or absorbent booms should be employed to contain any leaks or spills. ▪ Equipment should be inspected daily for leaks or damage and promptly repaired. ▪ Fueling and maintenance of vehicles should take place at least 65 feet away from waterways. ▪ In the event of a spill, follow procedures outlined in BMP GEN-7.
GEN-11	Paving and Asphalt Work	▪ Avoid paving and seal coating in wet weather or when rain is in the forecast, to prevent materials that have not cured from contacting stormwater runoff. ▪ Cover storm drain inlets and manholes when applying seal coat, tack coat, slurry seal or fog seal; and when saw cutting asphalt or concrete. ▪ Collect and recycle or appropriate dispose of excess abrasive gravel or sand. Do not sweep this material into gutters. ▪ Do not use water to wash down fresh asphalt concrete pavement. ▪ Use filter fabric, catch basin inlet filters, or gravel bags to keep slurry out of the storm drain system. ▪ Shovel, absorb or vacuum saw-cut slurry and dispose of all waste as soon as work is complete in one location or at the end of the workday. ▪ If sawcut slurry enters a catch basin, clean it up immediately.
GEN-12	Concrete, Grout, and Mortar Application	▪ Store concrete, grout, and mortar away from storm drains or waterways, and on pallets under cover to protect them from rain, runoff and wind. ▪ Wash out concrete equipment/trucks offsite or in a designated washout area, where the water will flow into a temporary waste pit, and in a manner that will prevent leaching into the underlying soil or onto surrounding areas. Let concrete harden and dispose of as garbage. ▪ When washing exposed aggregate, prevent washwater from entering storm drains. Block any inlets and vacuum gutters, hose washwater onto dirt areas, or drain onto a bermed surface to be pumped and disposed of properly.

GEN-13	Exclude Concrete from Channel	▪ For maintenance activities that involve concrete pouring, the County shall ensure that poured concrete be excluded from the wetted channel for a period of 30 days after it is poured. During that time, the poured concrete shall be kept moist, and runoff from the concrete shall not be allowed to enter a stream. Containment structures should be installed to control the placement of wet concrete and to prevent it from entering the channel outside of those structures. ▪ Commercial sealants may be applied to the poured concrete surface where difficulty in excluding water flow for a long period may occur. If sealant is used, water shall be excluded from the site until the sealant is dry. ▪ No dry concrete shall be placed on the banks or in a location where it could be carried into the channel by wind or runoff.
GEN-14	Concrete Washout Facilities need	▪ Concrete washout facilities should be established for maintenance activities that require on-site preparation and use of Portland cement concrete, asphalt concrete or cement mortar, establish concrete washout facilities. These facilities capture wash water, concrete and aggregate flushed from concrete mixers, chutes, etc. Concrete washouts may be contained settling basins dug into the ground, raised and contained structures, trailers, etc. They are also applicable for projects that require equipment washouts. ▪ An appropriate area for the washout must be identified at least 50 feet away from watercourses and storm drains in case of accidental breaching. The storage capacity of the basin must be sized correctly for the job. Construction Guidelines: ▪ The location of the concrete washout should be clearly labeled and all employees should be educated about proper concrete disposal. ▪ Avoid mixing excess amounts of fresh concrete or cement mortar on-site. ▪ Wash out concrete mixers only in designated washout areas where the water will flow into temporary sealed basins or onto stockpiles of aggregate base or sand. Use as little water as possible to reduce hardening and evaporation time of waste products. ▪ Construct a basin large enough to contain all liquid and waste concrete materials generated during washout procedures. A minimum basin size is 9 feet x 9 feet and 2 feet deep. Plastic liner materials shall be a minimum of 60-mil polyethylene sheeting free of holes and defects. ▪ Recycle washout by pumping back into mixers for reuse when possible. **BMP Maintenance**: ▪ The concrete washout should be checked frequently to ensure proper use and effectiveness. ▪ At 75 percent capacity, the washout must be cleaned or new facilities must be constructed and ready for use. **BMP Removal:** ▪ The hardened concrete and materials related to the washout must be broken up, removed, and disposed of in accordance to local regulations. ▪ Area disturbed by the concrete washout must be repaired.

GEN-15	Painting and Paint Removal	▪ Never clean brushes or rise paint containers into a street, gutter, storm drain, or stream. ▪ For water-based paints, paint out brushes to the extent possible, and rinse into a drain that goes to the sanitary sewer. Never pour paint down a storm drain. ▪ For oil-based paints, paint out brushes to the extent possible and clean with thinner or solvent in a proper container. Filter and reuse thinners and solvents. Dispose of excess liquids as hazardous waste. ▪ Paint chips and dust from non-hazardous dry stripping and sand blasting may be swept up or collected in plastic drop cloths and disposed of as trash. ▪ Chemical paint stripping residue and chips and dust from marine paints or paints containing lead, mercury, or tributyltin must be disposed of as hazardous waste. Lead based paint removal requires a state-certified contractor.
GEN-16	Timing of Work	▪ In general, routine maintenance and construction activities that take place in sensitive habitat and/or in channels below ordinary high water will be conducted during the dry season (June 15 through October 15). Maintenance activities that are in upland areas and that would not affect streams may occur during low rainfall years at times when there is no predicted rainfall (chance of precipitation is less than 30 percent chance of rain). Activities that are subject to permit requirements will be conducted during the period authorized by the permits.
GEN-17	Maintain Traffic Flow	▪ To the extent feasible, work shall be staged and conducted in a manner that maintains two-way traffic flow on roadways in the vicinity of the work site. ▪ Heavy equipment and haul traffic shall be prohibited in residential areas to the greatest extent feasible. When no other route to and from the site is available, heavy equipment and haul traffic through residential areas shall be restricted to the hours of 8 a.m. to 5:30 p.m., Monday through Friday. ▪ If heavy equipment or hauling is required beyond the hours above, the County or their contractor would provide notice to adjacent property owners 48 hours in advance of such activities.
GEN-18	Traffic Control and Public Safety	▪ In the event that work activities require the temporary closure of any traffic lanes, the County shall implement measures to guide traffic (such as signage and flaggers), safeguard construction workers, provide safe passage of vehicles, and minimize traffic impacts through the duration of work activities. The County also shall notify local emergency service providers regarding any planned lane closures. ▪ For any other work within or near the roadway that could pose a hazard to the public, the County shall install/implement appropriate measures, such as fences, barriers, flagging, guards, and/or signs, to give adequate warning and provide protection from the potentially dangerous condition. ▪ For work activities along or near roadways with sidewalks and bike lanes, the County shall implement measures to ensure the safe passage of pedestrians and bicyclists around the work site. ▪ Where work is proposed at a recreational park or trail, warning signs will be posted several feet beyond the limits of work. Signs will also be posted if trails will be temporarily closed. ▪ Public transit access and routes will be maintained in the vicinity of the work site. If public transit will be affected by temporary road closures and require detours, affected transit authorities will be consulted and kept informed of project activities.
GEN-19	Dust Management Controls	The County will implement the Bay Area Air Quality Management District (BAAQMD) Basic Dust Control Measures. Current measures stipulated by the BAAQMD Guidelines include the following: 1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day. 2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered. 3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited. 4. All vehicle speeds on unpaved roads shall be limited to 15 mph. 5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used. 6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points. 7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.
GEN-20	Firearms	No firearms (except for federal, State, or local law enforcement officers and security personnel) will be permitted at the project site to avoid harassment, killing or injuring of wildlife.
GEN-21	Domestic Animals	No animals (e.g., dogs or cats) can be brought to the project site to avoid harassment, killing or injuring of wildlife.
GEN-22	Site Stabilization	Earthwork will be completed as quickly as possible, and where practical, site restoration will occur immediately following maintenance. If site restoration involves planting, such activities may commence in late fall or early winter during the onset of rainy season.

		Bare soil surfaces resulting from maintenance and/or construction activities shall be covered with suitable erosion controls (seed or plant vegetation, fabrics, hydroseeding, mulch, etc.): ▪ Within 12 hours of any break in work unless project activities will resume within 7 days. ▪ No later than 3 days following the disturbance during the rainy season (approximately October through April). ▪ No later than 7 days following the disturbance during the dry season (approximately May through September).Every effort shall be made to immediately cover bare soil surfaces resulting from maintenance and/or construction activities prior to storms. Revegetation activities will include only local plant materials native to the San Francisco Peninsula region.
GEN-23	Fire Prevention	1. All earthmoving and portable equipment with internal combustion engines will be equipped with spark arrestors. 2. During the high fire danger period (April 1–December 1), work crews will: ▪ Have appropriate fire suppression equipment available at the work site. ▪ Keep flammable materials, including flammable vegetation slash, at least 10 feet away from any equipment that could produce a spark, fire, or flame. ▪ Not use portable tools powered by gasoline-fueled internal combustion engines within 25 feet of any flammable materials unless a round-point shovel or fire extinguisher is within immediate reach of the work crew (no more 25 feet away from the work area).
GEN-24	Investigation of Utility Line Locations	An evaluation of the locations of utility lines that could be affected by maintenance activities will be conducted annually as part of the preparation of the Annual Notification. Utilities will be avoided as much as possible. For maintenance areas with the potential for effects on utility services, the following measures will be implemented: 1. Utility excavation or encroachment permits will be required from the appropriate agencies. These permits include measures to minimize utility disruption. The County and its contractors will comply with permit conditions. Such conditions will be included in construction contract specifications. 2. Utility locations will be verified through a field survey (potholing) and use of the Underground Service Alert services. 3. Detailed specifications will be prepared as part of the design plans to include procedures for the excavation, support, and/or fill of areas around utility cables and pipelines. All affected utility services will be notified of the County's maintenance plans and schedule. Arrangements will be made with these entities regarding protection, relocation, or temporary disconnection of services. 4. Residents and businesses in the project area will be notified of planned utility service disruption 2 to 4 days in advance, in conformance with state standards. 5. Disconnected cables and lines will be reconnected promptly.
GEN-25	Retention of Tree Stumps / Rootwads	▪ Objects embedded/anchored in the bank, such as tree stumps, shall not be removed if removal could result in release of sediment into the channel. Stumps and rootwads that potentially serve as basking sites or that encourage pool formation should be left in place whenever possible. Protruding objects that could capture additional debris and result in obstruction of the channel (e.g. the branches and trunk of a downed tree) may be trimmed. If an embedded object must be removed to prevent a debris jam, turbidity control practices shall be used, and the bank shall be reseeded, re-vegetated and/or mulched following removal.
GEN-26	Decontamination of Project Equipment and Vehicles	▪ Equipment, boots and waders used for in-water maintenance activities will be decontaminated prior to entering and exiting the maintenance site and/or between each use in different water bodies to avoid the introduction and transfer of organisms between water bodies. Methods to be employed may include: drying, using a hot water soak, or freezing, as appropriate to the type of gear or equipment. The County shall begin the decontamination process by thoroughly scrubbing equipment, paying close attention to small crevices such as boot laces, seams, net corners, etc., with a stiff-bristled brush to remove all organisms. To decontaminate by drying, the County shall allow equipment to dry thoroughly (i.e., until there is a complete absence of water), preferably in the sun, for a minimum of 48 hours. To decontaminate using a hot water soak, the County shall immerse equipment in 140°F or hotter water and soak for a minimum of 5 minutes. To decontaminate by freezing, the County shall place equipment in a freezer 32°F or colder for a minimum of 8 hours. Repeat decontamination is required only if the equipment/clothing is removed from the site, used within a different waterbody, and returned to the project site. ▪ Vehicles, watercraft, and other maintenance equipment used for in-water maintenance activities that are too large to immerse in a hot water bath shall be decontaminated by pressure washing with hot water (minimum of 140°F at the point of contact or 155°F at the nozzle or by using other effective techniques). Watercraft engines and all areas that could contain standing water (e.g., live wells, bilges, etc.) shall be flushed for a minimum of 10 minutes. Following the hot water wash, vehicles, watercraft and equipment shall be dried as thoroughly as possible. ▪ A bleach solution shall be used to decontaminate vehicles, watercraft and other maintenance gear and equipment at a designated location where runoff can be contained and not allowed to enter streams or other sensitive habitat areas.
GEN-27	Vegetation and Tree Removal	▪ The disturbance or removal of vegetation shall not exceed the minimum necessary to complete maintenance activities. The use of bulldozers, backhoes, or other heavy equipment to remove vegetation along stream banks shall be avoided wherever feasible. ▪ The County may remove up to two non-hazardous trees greater than 12 inches in diameter per year from natural channels below ordinary high water if the trees are restricting the capacity of the channel, causing erosion or flooding, or limiting access to perform maintenance work. Trees will be cut at ground level and the root mass left in place to maintain bank stability. No non-hazardous trees greater than 36 inches in diameter will be removed under this program. This measure does not apply to trees considered a hazard as defined by the International Society of Arboriculture, which may include dead or dying trees, dead parts of live trees, or unstable live trees (due to structural defects or other factors) that are within

		striking distance of people or property (a target) that have the potential to cause death, injury, or substantial property damage. ▪ Removed vegetation shall be placed directly into a disposal vehicle and removed from the site, and shall not be permitted to remain onsite overnight. However, if removed vegetation will be used onsite for erosion control or slash and will not be moved or disturbed, it may be stockpiled onsite for longer than an overnight. Stockpiled vegetation shall not be piled on the ground unless it is later transferred, piece by piece, under the direct supervision of the biological monitor or qualified biologist.
GEN-28	Herbicide Application	▪ Herbicide application shall only be conducted when the climate is dry and when wind speeds do not exceed 7 miles per hour. Herbicides shall not be used in or adjacent to any fish-bearing stream, lake, pond or other water bodies supporting suitable habitat for California red-legged frog or other listed species.

BMP Number	BMP Title	BMP Description
Erosion Control Measures		
EC-1	Brush Layering	Brush layering is a technique used to stabilize shallow slope failures or rebuild fill slopes with live brush cuttings (usually willows or other types of branches) with soil backfill or soil lifts. Live brush layers act as horizontal drains and improve slope stability by providing tensile strength and natural revegetation. Brush layering may include the use of synthetic geogrids or fabric soil wraps, large vegetated boulder revetments, or other structural toe support. For a more detailed description of this BMP, refer to Appendix A.
EC-2	Brush Packing	Brush packing is a biotechnical gully and slump repair technique. Brush packing utilizes alternating layers of live branch cuttings (from rootable plant species) and soil to repair large rills, gullies, and slumps. The brush packing technique is more appropriate for the repair of gullies on slopes, and it can be implemented with hand labor. For a more detailed description of this BMP, refer to Appendix A.
EC-3	Live Staking	Live staking involves the insertion of live, vegetative cuttings into the ground in a manner that allows the cutting (stake) to take root and grow. This BMP is used to reduce the potential for soil to become water borne, to reduce water velocity and erosive forces, and to aid in habitat protection. Poles used in willow walls and through rip rap may be a structural application. Sprigs may be used in individual planting spots along a streambank. For a more detailed description of this BMP, refer to Appendix A.
EC-4	Live Pole Drain	Live pole drains are a biotechnical technique intended to drain excess moisture away from an unstable site. Plants (typically willows) are used to construct bundles which will sprout and grow, with the moisture continuing to drain from the lower end. The bundles are placed in shallow trenches in a manner that they intersect and collect excessive slope moisture. See Appendix A for additional description about this BMP.
EC-5	Wattles/ Fascines	Wattles and fascines are live branch cuttings, usually willows, bound together into long, tubular bundles used to stabilize slopes and stream banks. Both wattles and live fascines are true biotechnical practices. The live branches and live stakes provide the biological element while the stems, rope ties and wedge-shaped wooden stakes all combine to provide the structural elements. Fascines differ from wattles in that the branch cuttings all point in the same direction in fascines, where they may point in either direction in wattles. Wattles are typically aligned on contour, where fascines are angled slightly upslope and thus tend to produce more vigorous growth. For a more detailed description of this BMP, refer to Appendix A.
EC-6	Hand Seeding	Hand seeding is broadcasting grass seed on disturbed or bare soil areas by hand or a hand seeding device. This BMP is used to reduce the potential for soil to become water or air borne, reduce erosion after vegetation establishment, provide for vegetative buffers and aid in habitat protection. Seeding with appropriate seed mixes also helps discourage colonization by non-native and invasive plant species. For a more detailed description of this BMP, refer to Appendix A.
EC-7	Hydroseeding	Hydroseeding is broadcasting grass seed, tackifier, wood fiber mulch and water on disturbed areas using a hydroseeding machine. This BMP is used to reduce the potential for soil becoming water or air borne, to reduce erosion after vegetation is established, provide vegetative buffers and to aid in habitat protection. Seeding with appropriate seed mixes will also help discourage colonization by non-native and invasive plant species. Hydroseeding may be used after soil disturbance is completed at construction/maintenance sites and/or on bare slopes. For a more detailed description of this BMP, refer to Appendix A.
EC-8	Mulching	Mulching is the application of rice or sterile straw, wood chips, leaf litter, redwood duff, or other suitable materials on the soil surface applied manually or by machine. This BMP is used to reduce the potential for soil becoming water or air borne, and to encourage vegetation establishment. This BMP is used to protect the soil surface and to protect newly seeded areas. For a more detailed description of this BMP, refer to Appendix A.
EC-9	Vegetative Buffer	A vegetative buffer is a strip of vegetation adjacent to sensitive areas, ditches, pavement and water bodies. This BMP prevents soil from becoming water borne and may help restore shallow slope failures by trapping soil and debris. For a more detailed description of this BMP, refer to Appendix A.

EC-10	Erosion Control Blankets & Mats	Erosion control blankets and mats are installed to protect the prepared soil surface of a steep slope. This BMP may be used at maintenance sites to provide stabilization/protection on steep slopes or stream banks. Erosion control blankets and mats are available in a variety of materials including jute, excelsior, blanket material, straw, wood fiber blanket, coconut fiber blanket, coconut fiber mesh, and straw coconut fiber blanket. Material selection should be based on the size of area, slope, surface conditions, revegetation plans, and channel velocity. Coir fabric/netting is a geo-textile product made from coconut fibers loosely woven into a fabric usually packaged in roll form. This fabric can be used to provide a reduction in water velocity/erosive forces and/or habitat protection and topsoil stabilization. Erosion control blankets and mats may be used in combination with seeding and/or vegetation. For a more detailed description of this BMP, refer to Appendix A.
EC-11	Surface Roughening	Surface roughening is a technique for roughening a bare soil surface with furrows running across the slope, stair stepping, or tracking with construction equipment. Surface roughening is intended to aid the establishment of vegetative cover from seed, to reduce runoff velocity and increase infiltration, and to reduce erosion and provide for sediment trapping. This BMP is typically applied on slopes steeper than 3:1. For a more detailed description of this BMP, refer to Appendix A.
EC-12	Rolling Dip	Rolling dips are ridges or ridge-and-channels constructed diagonally across a sloping road or utility right-of-way that is subject to erosion to limit the accumulation of erosive volumes of water on roads by diverting surface runoff at designated intervals. Rolling dips are appropriate to use on low and moderate grades and on both high or low traffic roads. For a more detailed description of this BMP, refer to Appendix A.
EC-13	Slope or Bank Stabilization	Where biotechnical methods are unsuitable for stabilizing streambanks due to site specific conditions such as steep slopes or limited right-of-way width, hardened engineered solutions such as rock slope protection, solider pile walls, retaining walls, or slope soil nailing may be utilized along a failed portion of slope to provide a buttress against additional failure. To the extent feasible, this BMP should be combined with biotechnical solutions through installation of vegetated rock slope protection. Refer to Appendix A for a more detailed description of this BMP.
EC-14	Energy Dissipator	An energy dissipator is a structure designed to control erosion at the outlet of a channel or conduit by reducing the velocity of flow and dissipating the energy. This BMP is recommended at the outlet of any new or replacement drainage culvert, which are points of high erosion potential. Energy dissipators are effective in absorbing the impact of flow and reducing the velocity to non-erosive levels. For a more detailed description of this BMP, refer to Appendix A.
Sediment/Water Quality Control Measures		
SC-1	Gravel Bags	Gravel bags can be used to keep water away from work areas and unstable slopes or for constructing cofferdams and clean water bypasses. This BMP is also typically used at construction or maintenance sites to protect storm drain outlets, gutters, ditches, and drainage courses. For a more detailed description of this BMP, refer to Appendix A.
SC-2	Silt Fence	A silt fence is a temporary sediment barrier consisting of fabric stretched across and attached to supporting posts and entrenched into soil. This BMP is generally used for perimeter protection (around construction/maintenance sites, stockpile areas). It may also be installed perpendicular to the flow direction to slow or stop water and to allow perimeter filtration, settling of soil particles, and to reduce water velocity. For a more detailed description of this BMP, refer to Appendix A.
SC-3	Straw Log, Straw Roll, Coir Log	Straw rolls/logs or coir logs may be used for temporary soil stockpile protection; protection of storm drains, gutters, and drainage courses; temporary check dams; bank or slope stabilization; and streambank toe protection. Alternatives to straw rolls/logs and coir logs include compostable filter socks/berms comprised of natural fibers and other bio-based materials. For a more detailed description of this BMP, refer to Appendix A.
SC-4	Inlet Protection	Storm drain inlets can be protected through installation of temporary barriers such as silt fences, gravel bags, and other proprietary barriers like geotextile inserts, biofilter bags, or compost socks. These barriers are intended to prevent and reduce the sediment discharged into storm drains by ponding runoff and allowing sediment to settle out. For a more detailed description of this BMP, refer to Appendix A.
SC-5	Stormwater Separation Systems	Stormwater separation systems are engineered devices installed in storm drain facilities to remove solids, grease and other pollutants. These may be installed where deep structures allow for their placement and maintenance, or where sufficient quantities of pollutant materials require regular removal in order for the storm drains to operate correctly. For a more detailed description of this BMP, refer to Appendix A.
SC-6	Diversion Berm	A diversion berm is a temporary ridge of compacted soil or aggregate base material, or contiguous bag berm constructed at the top or base of a disturbed slope. It may also consist of asphalt concrete or "cutback" at the top of a disturbed slope. This BMP is intended to direct stormwater runoff away from an unstable slope. For a more detailed description of this BMP, refer to Appendix A.
SC-7	Silt Curtain	The County shall install silt curtains or other appropriate silt filtering devices around excavation sites to prevent heavily silted water from impacting areas around the work site. The silt curtain or silt filtering device shall be maintained throughout all phases of excavation.
SC-8	Turbidity Monitoring	During in-water maintenance activities, the County will monitor turbidity levels up and downstream of the maintenance work area prior to conducting maintenance. The County will maintain a log of turbidity data and ensure that activities do not result in increases in turbidity of the stream of more than 20 percent of upstream sampling locations, as measured visually or by nephelometric turbidity units (NTU). Work will be halted if turbidity/siltation levels exceed 20 percent of upstream sampling levels and CDFW will be contacted for further guidance to ensure activities do not harm aquatic life.

Dewatering Measure		
DW-1	Channel Dewatering	• When in-water construction is unavoidable, streamflow shall be diverted around work areas by either installing cofferdams and/or clean water bypass systems. A cofferdam is a temporary structure built into a waterway to enclose a construction area and reduce sediment pollution from construction work in or adjacent to water. A clean water bypass is typically used for short-term diversion of small amounts of water over short distances to enable dewatering of a maintenance site. Depending on site conditions, these systems may be either gravity driven or require use of a pump to divert water around a construction area. For a more detailed description of this BMP, refer to Appendix A. • No dewatering will be conducted at sites with recent document occurrences of coho salmon within the past 5 years.
Sediment Testing and Disposal Measure		
ST-1	Testing and Disposal of Sediment	Depending on the location of the sediment removal site and upstream and adjacent land uses, the County will test the sediment prior to removal to determine suitability for disposal or reuse based on its chemical qualities. The test results and proposed disposal or reuse locations will be submitted to the RWQCB for review and approval. Samples will be analyzed according to the Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines (RWQCB 2000), as appropriate for the proposed disposal or reuse site. The results will be compared against federal and state environmental screening levels (ESLs) for protection of human health, groundwater quality, and terrestrial receptors. If hazardous levels of contaminants (as defined by federal and state regulations) are present, the material will be taken to a permitted hazardous waste facility.

Sources: San Mateo Countywide Water Pollution Prevention Program, 2014; County of San Mateo, 2004 and 2013.

BMP Number	BMP Title	BMP Description
BIO-1	Environmental Awareness Training	Prior to commencing maintenance activities in a given year, all participating maintenance personnel will attend a worker environmental awareness training program. The training will include a brief review of special-status species, sensitive habitats, and other sensitive resources that may exist in the project area, including field identification, habitat requirements, and the legal status and protection of each relevant species, as well as locations of sensitive biological resources. The training will include materials concerning the following topics: sensitive resources, resource avoidance, permit conditions, and possible consequences for violations of State or Federal environmental laws. The training will cover the maintenance activity's conservation measures, environmental permits, and regulatory compliance requirements, as well as the roles and authority of the monitors and biologist(s). It will include printed material and an oral training session by a qualified biologist.
BIO-2	Minimize Injury or Mortality of Fish and Amphibian Species during Dewatering	Prior to dewatering a construction site, all reasonable efforts shall be made to capture and relocate native fish and amphibian species if necessary to avoid direct mortality and minimize take. Streams that support a sensitive species (e.g., steelhead, California red-legged frog) will require a relocation effort led by a qualified biologist (see also BMPs BIO- 3 through BIO-5). The following measures are consistent with those defined as *reasonable and prudent* by NMFS for projects concerning several central California Evolutionarily Significant Units for coho salmon and steelhead trout. ▪ Fish relocation activities will be performed only by qualified fisheries biologists that have experience with fish capture and handling. ▪ Perform relocation activities during morning periods when air temperatures are coolest. ▪ Periodically measure air and water temperatures. Cease activities when water temperatures exceed temperatures allowed by CDFW and NMFS. ▪ Capture methods may include fish landing nets, dip nets, buckets and by hand. ▪ Exclude fish from re-entering work area by blocking the stream channel above and below the work area with fine-meshed net or screens. Mesh will be no greater than 1/8 inch (3.1mm). The bottom edge of net or screen will be completely secured to the channel bed to prevent fish from re-entering work area. Exclusion screening will be placed in areas of low water velocity to minimize impingement of fish. Screens will be checked periodically and cleaned of debris to permit free flow of water. ▪ Prior to capturing fish, the qualified biologist will determine the most appropriate release location(s). Captured aquatic life shall be released immediately in the closest suitable body of water adjacent to the work site, taking into consideration the following when selecting release site(s): A. Similar water temperature as capture location B. Ample habitat for captured fish C. Low likelihood of fish re-entering work site or becoming impinged on exclusion net or screen. D. Avoid areas with large concentrations of potential predators in immediate vicinity. ▪ Minimize handling of salmonids. However, when handling is necessary, always wet hands or nets prior to touching fish. ▪ Temporarily hold fish in cool, shaded, aerated water in a container with a lid or in a live–car (i.e., a net enclosure that can be placed in a pond to temporarily hold the fish). ▪ If fish are held in a container, provide aeration with a battery-powered external bubbler. Protect fish from jostling and noise and do not remove fish from this container until time of release. ▪ Place a thermometer in holding containers and, if necessary, periodically conduct partial water changes to maintain a stable water temperature. If water temperature reaches or exceeds those allowed by CDFW and NMFS, fish should be released and rescue operations ceased. ▪ Avoid overcrowding in containers. Have at least two containers and segregate young-of-year fish from larger age-classes to avoid predation. Place larger amphibians, such as Pacific giant salamanders, in container with larger fish. ▪ If fish are abundant, periodically cease capture, and release fish at predetermined locations. ▪ Visually identify species and estimate year-classes of fish at time of release. ▪ Count and record the number of fish captured. Avoid anesthetizing or measuring fish. ▪ Submit reports of fish relocation activities to CDFW and NMFS in a timely fashion.

		▪ If feasible, plan on performing initial fish relocation efforts several days prior to the start of construction. This provides the fisheries biologist an opportunity to return to the work area and perform additional passes immediately prior to construction. In many instances, additional fish will be captured that eluded the previous day's efforts. The biological monitor or qualified biologist shall check daily for stranded aquatic life as the water level in the dewatering area drops. ▪ If mortality during relocation exceeds the amount authorized by the applicable permits or, if no amount is specified, 5 percent, stop efforts and immediately contact the appropriate agencies (CDFW and NMFS).

7. APPENDIX B – Pre-Construction Reports

The Implementation Procedure outlined in Section 1.4 requires project applicants to submit a project package to NMFS for review and acceptance at least 30 days prior to the start of construction. The project package will include this Action Notification Form as well as a detailed project description and 60% complete project design plans as separate attachments. The project package should be submitted electronically to the Central Coast Branch Chief at NMFS' Santa Rosa Office (Mandy.Ingham@noaa.gov). Please make sure that information detailed below is part of the package.

NOAA

San Mateo Routine Maintenance Program
Regional General Permit Programmatic

ACTION NOTIFICATION FORM

Project Information

Applicant Name:

Organization Name:
(if applicable)

Project Name:

Project Location:

Project Start Date: Select Date Stream: Latitude:

Project End Date: Select Date Watershed: Longitude:

Is stream channel dewatering anticipated for this project? Select One

Approximate length of channel to be dewatered (in linear feet):

* Please attach a detailed project description and design plans that are at least 60% complete.

8. APPENDIX C – Post-Construction Reports

The Implementation Procedure outlined in Section 1.4 requires project applicants to submit post-construction reports by January 15 of the year immediately following construction. Reports must include details of the completed project, fish collection and relocation efforts, and site restoration efforts. The form below includes the minimum information necessary to satisfy reporting requirements. Photo documentation, project plans, and any additional information should be submitted electronically to the Central Coast Branch Chief at NMFS' Santa Rosa Office (Mandy.Ingham@noaa.gov).

POST-CONSTRUCTION REPORT

PART A—General Information

1	Applicant name	
2	Organization name (if applicable)	
3	Project name	
4	Project location	
5	Habitat Plan application file number	
6	Regional General Permit number	
7	Project start date	*Select date*
8	Project end date	*Select date*
9	Stream	
10	Watershed	
11	Latitude	
12	Longitude	

PART B—Construction

1	Construction start date	*Select date*	
2	Construction end date	*Select date*	
3	Total linear feet of stream disturbed		
4	Total linear feet of stream dewatered		
5a	Were all applicable terms and conditions from the programmatic met?	☐ **Yes** *Skip 5b*	☐ **No** *Answer 5b*
	5b Describe which terms and conditions were not met and why.		
6a	Was the project installed as approved and authorized?	☐ **Yes** *Skip 6b*	☐ **No** *Answer 6b*
	6b Describe any change(s) and why the change(s) was/were necessary.		
7a	Were there any unanticipated effects on steelhead or critical habitat during construction activities?	☐ **Yes** *Answer 7b*	☐ **No** *Skip 7b*
	7b What Avoidance and Minimization Measures were implemented to minimize those unanticipated effects?		

PART B ATTACHMENTS

Attach a full copy of the as-built drawings as a separate file.	☐ **Attached**
Attach photo documentation of pre- and post-project conditions as a separate file. Photos should be taken from the four cardinal directions form established photo points for comparison to pre-project photo documentation.	☐ **Attached**

POST-CONSTRUCTION REPORT		
PART B ATTACHMENTS		
Attach a full copy of the as-built drawings as a separate file.	☐ **Attached**	
Attach photo documentation of pre- and post-project conditions as a separate file. Photos should be taken from the four cardinal directions form established photo points for comparison to pre-project photo documentation.	☐ **Attached**	
PART C—Fish Relocation		
1 Was fish relocation required as part of the project?	☐ **Yes** *Complete Part D*	☐ **No** *Skip Part D*
2 Target species		
3 Relocation date	*Select date*	
4 Relocation time		
5 Relocation duration		
6 Was NMFS notified at least 2 weeks prior to relocation activities?	☐ **Yes**	☐ **No**
7 Describe the location where fish were relocated *from* (e.g., water temperature, flow, turbidity, substrate type, habitat availability, and quality).		
8 Describe the location fish where fish were relocated *to* (e.g., water temperature, flow, turbidity, substrate type, habitat availability, and quality).		
9 Describe the methods used to collect, hold, and transport fish during relocation efforts.		
10 What (if any) unanticipated circumstances arose during fish relocation activities? Did these unanticipated circumstances have effects on steelhead or their critical habitat?		
11 Provide the name/contact information for the qualified biologist(s) involved in the relocation. Include the scientific collection permit number.		
12 Provide the name/contact information for the qualified assistant(s) involved in the relocation. Include the scientific collection permit number.		

POST-CONSTRUCTION REPORT

13 In the table below, summarize the total number of fish captured, injured, and/or killed across all relocation events.

Species	Captured	Injured	Killed

PART C ATTACHMENTS

Attach photo documentation of stream sites salmonids were relocated from and to. Include photographs that show both upstream and downstream conditions. Attach photo documentation as a separate file.	☐ **Attached**