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

July 14, 2020 **Refer to NMFS No:** WCRO-2020-00585

James Mazza
Regulatory Division Chief
San Francisco District, U.S. Army 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 Upper York Creek Ecosystem Restoration and Aquatic Habitat Enhancement Project in Saint Helena, California (Corps File No. 2016-00343)

Dear Mr. Mazza:

Thank you for your letter of March 5, 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 Upper York Creek Ecosystem Restoration and Aquatic Habitat Enhancement Project (Project). 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 (16 U.S.C. 1855(b)) for this action. However, after reviewing the proposed action, we concluded that there are no adverse effects on EFH. Therefore, we are hereby concluding EFH consultation.

In the enclosed biological opinion, NMFS concludes the Project is not likely to jeopardize the continued existence of threatened Central California Coast (CCC) steelhead), nor is the Project likely to result in the destruction or adverse modification of critical habitat for CCC steelhead. However, NMFS anticipates take of CCC steelhead will occur as a result of project construction. An incidental take statement with non-discretionary terms and conditions is included with the enclosed biological opinion.

Please contact Daniel Logan, North-Central Coast Office, San Francisco Bay Branch, at (707) 575-6053 or dan.logan@noaa.gov, if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: William Connor, US Army Corps of Engineers, San Francisco, California
Joseph Terry, US Fish and Wildlife Service, Sacramento, California
Erica Yelensky, US Environmental Protection Agency, San Francisco, California
Luisa Valiela, US Environmental Protection Agency, San Francisco, California
Setenay Bozkurt Frucht, Regional Water Quality Control Board, Oakland, California.
Agnes Farres, Regional Water Quality Control Board, Oakland, California.
Karen Weiss, California Department of Fish and Wildlife, Fairfield, California
Garrett Allen, California Department of Fish and Wildlife, Fairfield, California
Jonathan Koehler, Napa Resource Conservation District, Napa, California
Erica Ahmann Smithies, City of St. Helena, St. Helena, California
Copy to ARN File #151422WCR2018SR00236

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

Upper York Creek Ecosystem Restoration and Aquatic Habitat Enhancement Project

NMFS Consultation Number: WCRO-2020-00585

Action Agency: U.S. Army Corps of Engineers, Regulatory Division, San Francisco District

Affected Species and NMFS' Determinations:

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

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

Issued By:

Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Date: July 14, 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 completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within two weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at NMFS North-Central Coast Office in Santa Rosa, California (ARN #151422WCR2018SR00236).

1.2. Consultation History

Discussions between NMFS and the City of Saint Helena (City) regarding the fate of York Creek Dam have occurred over the past 20 years. The majority of technical assistance provided by NMFS during this period pertained to dam removal alternatives and potential sediment management options. Federal agency partners in this technical assistance included U.S. Army Corps of Engineers (Corps), Environmental Protection Agency (EPA), Fish and Wildlife Service (FWS), and NOAA Restoration Center. State agencies and local partners in this effort included the San Francisco Bay Regional Water Quality Control Board, California Department of Fish and Wildlife, San Francisco Estuary Partnership, and the Napa County Resource Conservation District (Napa County RCD). Many meetings, site visits, and conference calls occurred to discuss the goals and objectives a dam removal project on York Creek. The physical setting of the project and the amount of accumulated sediment created several challenging issues and required the collection of new information and interpretation of available information. Over the years of project development, alternative pathways to meet objectives were explored and different conceptual project designs were evaluated.

From March 2017 to July 2018, the state and federal agencies attended numerous meetings with representatives from the City and their consultant, Michael Baker International. During this period, the City in coordination with NMFS and other agencies began to focus on an approach to dam removal that intends to let natural processes develop a geomorphically stable self-formed channel over time. In late 2018, the City brought in WRA as their consultant on the project and work with the agencies continued on this approach to dam removal.

The following documents were provided to NMFS regarding the proposed Project:

On March 27, 2020, NMFS was provided the *Section 7 Biological Assessment for the Upper York Creek Ecosystem Restoration and Aquatic Habitat Enhancement Project in St. Helena, Napa County, California* prepared by WRA.

On March 27, 2020, NMFS was provided the *Basis of Design Memo for the Upper York Creek Ecosystem Restoration and Aquatic Habitat Enhancement Project* prepared by WRA.

On May 6, 2020, NMFS was provided the *Upper York Creek Ecosystem Restoration and Aquatic Habitat Enhancement Project 100% Plans* prepared by EKI Environmental and Water, Inc.

On May 6, 2020, NMFS was provided the *Draft Geomorphic and Restoration Monitoring and Adaptive Management Plan for the Upper York Creek Ecosystem Restoration Project, Napa County* prepared by the Napa County Resource Conservation District and WRA.

On March 5, 2020, the Corps requested initiation of formal consultation with NMFS, North-Central Coast Office for Upper York Creek Ecosystem Restoration and Aquatic Habitat Enhancement Project (Project) by the City of St. Helena. The proposed project is on and adjacent to York Creek and is located west of Spring Mountain Road, approximately 1.7 miles upstream from the intersection of Spring Mountain Road and Madrona Avenue, near the City of St. Helena, Napa County, California. Additional information regarding geotechnical and sediment transport modeling was provided by the City's consultant team to NMFS and the Corps on April 13, 2020. On May 6, 2020, NMFS was provided updated engineering plans for the Project and these plans provided sufficient information to initiate consultation with the Corps.

1.3. Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). The Corps proposes to provide authorization pursuant to Section 404 of the Clean Water Act of 1972, as amended (33 U.S.C. § 1344 *et seq*.) to the City to remove a significant portion of York Creek Dam and undertake channel and riparian restoration actions in and along York Creek (Corps File No. SPN-2016-00343). The proposed Upper York Creek Ecosystem Restoration and Aquatic Habitat Enhancement Project (Project) is located west of Spring Mountain Road, approximately 1.7 miles upstream from the intersection of Spring Mountain Road and Madrona Avenue, near the City of St. Helena, Napa County, California, latitude 38.510950°N and longitude 122.49861°W.

The proposed Project consists of several related actions at and near the York Creek Dam site to achieve the City's ecosystem restoration and aquatic habitat enhancement goals. These restoration actions include: (1) notching York Creek Dam down to bedrock; (2) excavation of coarse sediment trapped in the York Creek Dam reservoir; and (3) installation of instream structures made of logs in York Creek downstream from the dam site. These actions are designed to return natural sediment transport functions to York Creek and to improve aquatic habitat heterogeneity. These actions are designed to benefit CCC steelhead and designated critical habitat in York Creek by restoring fish passage and enhancing habitat conditions for that species. The proposed actions will occur within the York Creek watershed in Napa County, California. Proposed demolition and construction activities are expected to occur over a period of approximately 5 months.

Successful completion of this Project will addresses a number of high priority actions to facilitate recovery of CCC steelhead in York Creek and the Napa River watershed related to geomorphic processes, aquatic habitat conditions, floodplain connectivity, and conditions of the riparian plant community (Table 1).

Table 1. High priority recovery actions for CCC steelhead addressed, in whole or in part, by this Project. A full description of recovery actions for CCC steelhead is found in NMFS (2016a).

Action ID	Abbreviated Action Description
NpR-CCCS-5.1.1.5	Remove York Dam.
NpR-CCCS-6.1.1.2	Identify and optimize the appropriate number of key LWD pieces in the following highest priority sub-basins: Redwood Creek, Dry Creek, Ritchie Creek, Sulphur Creek, and York Creek.
NpR-CCCS-6.1.2.1	Evaluate, develop, and implement strategies to increase primary pool frequency in high priority reaches within the following tributaries: Bale Slough, Bear Canyon (& tribs), Bell, Brown, Carneros, Conn, Dry, Milliken, Montgomery, Napa, Pickle, Redwood, Sulphur, Wing Canyon, and York creeks.
NpR-CCCS-6.1.2.2	Develop and implement process-based restoration plans to restore channel geomorphic processes and habitat complexity suitable for spawning and rearing steelhead within the following tributaries: Bale Slough, Bear Canyon (& tribs), Bell, Brown, Carneros, Conn, Dry, Milliken, Montgomery, Napa, Pickle, Redwood, Sulphur, Wing Canyon, and York creeks.
NpR-CCCS-6.1.4.1	Identify, evaluate, and improve shelters in adult salmonid staging pool within the main stem Napa River and the following tributaries: Bear Canyon (& tribs), Browns, Canon, Conn, Health, Montgomery, Sulphur, Napa, and York creeks.
NpR-CCCS-8.1.1.3	Evaluate, design, and implement gravel quality and quantity strategies to the extent that the maximum amount of spawning habitat is achieved in the following sub-basins: Redwood Creek, Dry Creek, Ritchie Creek, Sulphur Creek, Carneros, Huichica, and York Creek.
NpR-CCCS-2.1.1	Rehabilitate and enhance floodplain connectivity.
NpR-CCCS-2.1.1.5	Incorporate obstructions (LWD, boulders) in floodplain project designs to increase velocity refuge for salmonids.
NpR-CCCS-6.1.1.1	Evaluate, prescribe, and implement an appropriate number of key LWD pieces to enhance summer rearing conditions in potential steelhead spawning and rearing areas throughout the tributaries of the Napa River watershed.

NpR-CCCS-6.1.1.2	Identify and optimize the appropriate number of key LWD pieces in the following highest priority sub-basins: Redwood Creek, Dry Creek, Ritchie Creek, Sulphur Creek, and York Creek.
NpR-CCCS-6.1.1.7	Strategically place LWD in locations that optimize seasonal habitat features for winter (including spring/fall) rearing juvenile steelhead.
NpR-CCCS-6.1.2	Increase frequency of primary pools.
NpR-CCCS-6.1.2.2	Develop and implement process-based restoration plans to restore channel geomorphic processes and habitat complexity suitable for spawning and rearing steelhead within the following tributaries: Bale Slough, Bear Canyon (& tribs), Bell, Brown, Carneros, Conn, Dry, Milliken, Montgomery, Napa, Pickle, Redwood, Sulphur, Wing Canyon, and York creeks.
NpR-CCCS-6.1.3	Improve pool/riffle/flatwater ratios (hydraulic diversity).
NpR-CCCS-6.1.4	Improve shelter in streams.
NpR-CCCS-6.1.4.1	Identify, evaluate, and improve shelters in adult salmonid staging pool within the main stem Napa River and the following tributaries: Bear Canyon (& tribs), Browns, Canon, Conn, Health, Montgomery, Sulphur, Napa, and York creeks.
NpR-CCCS-8.1.1	Improve instream gravel quality to reduce embeddedness.
NpR-CCCS-8.1.1.1	Evaluate, design, and implement gravel quality and quantity strategies to the extent that the maximum amount of spawning and incubation habitat is achieved below all dams.
NpR-CCCS-8.1.2.3	Develop strategies to improve gravel quality conditions within all current and potential summer rearing reaches below all dams with emphasis on macro-invertebrate production.
NpR-CCCS-12.1.5.1	Promote the re-vegetation of the native riparian plant community within inset floodplains and riparian corridors to provide future recruitment of large wood and other shelter components.
NpR-CCCS-13.1.5.1	Ensure future retention and recruitment of large woody and root wads to rehabilitate existing stream complexity, pool frequency, and depth.

The following is a summary of work activities proposed by the City:

1.3.1 Channel Dewatering

To facilitate construction of the notch in the dam and channel restoration, the City proposes to dewater approximately 1,000 linear feet of the York Creek channel. The City will use temporary cofferdams to dewater York Creek starting about 100-150 feet downstream from the dam and continuing upstream past the dam and the influence of the reservoir. The cofferdams may be in place for the entire construction period, from June 1 through October 31. The streamflow of York Creek will be bypassed to the lower cofferdam, using gravity and a pipe system sized sufficiently to handle baseflow conditions anticipated during this time period. When construction is completed, the flow diversion structure will be removed as soon as possible in a manner that will allow flow to resume with the least disturbance to the substrate. To minimize the risk of stranding fish, cofferdams will be removed so surface elevations of water impounded above the cofferdam will not be reduced at a rate greater than one inch per hour. This will minimize the risk of beaching and stranding of fish as the area upstream from the upper cofferdam becomes dewatered.

If pumping is necessary to dewater the construction site between the cofferdams, the water will be discharged to an upland location so potentially contaminated water does not drain back to the stream channel. Pump intakes will be covered with appropriate sized screening material, complying with currently approved NMFS Fish Screening Criteria (NMFS 2011), to prevent potential entrainment of fish or amphibians that failed to be removed. The sump and intake will be checked periodically for fish and other aquatic wildlife.

1.3.2 Construction of Notch in York Creek Dam

A notch and channel will be constructed through the dam at approximately the pre-dam elevation. The width of the notch in the dam at its base will be 20 feet, a similar size to active channel in the area of the dam. The side slopes of the notch will be between 2:1 and 1.5:1 (horizontal:vertical). Soils excavated from the notched area will be screened to remove large rocks useful for reuse as habitat features. Screened soils will be compacted into the existing concrete spillway structure adjacent to Spring Mountain Road or disposed of at the Clover Flat Landfill. Soil not excavated from the dam will remain in place.

To protect Spring Mountain Road, rock slope protection (RSP) will be placed at the toe of slope of the east side of the notch using Caltrans Class VIII rock, with 30" median diameter and median weight of 1 ton, underlain by Caltrans Class 8 geotextile fabric. The RSP will extend from the dam notch upstream through the impounded sediment for a distance of approximately 200 feet. RSP will be keyed in to stable dam material on the upstream end to prevent flanking of the revetment.

Although some tree removal from the face and top of the dam will be required, the number of trees impacted will limited to only as necessary to allow for excavation and restoration access. Trees and shrubs of suitable size will be used as components for the Project's large wood structures or other habitat features (described below).

1.3.3 Excavation of Impounded Sediment

The City proposes to remove a large portion of the sediment collected behind York Creek Dam and the remainder will be allowed to move downstream with high streamflow events during periods of winter and spring precipitation. The City proposes to mechanically remove 12,140 CY of sediment from behind the dam (WRA 2020a), leaving about 4,000[1] CY of sediment

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[1] Two documents provided by the City's consultants offer conflicting estimates of the volume of impounded sediment that will be available post-excavation for potential downstream transport. The biological assessment

available to be transported to Lower York Creek and eventually to the Napa River and San Francisco Bay (Stillwater Sciences 2020). Post-project construction, the estimated long-term average coarse sediment supply rate into the reservoir is between 244 – 1,333 CY/year (Stillwater Sciences 2018a).

The impounded sediments excavated from the reservoir will be screened to remove large rocks (≥ 2-ft diameter) useful for reuse as habitat features. Following the removal of the large rocks, screened sediments will be transported to the Clover Flat Landfill for disposal. Sediment excavation will be performed to create a pilot channel beginning downstream at the dam notch and continuing upstream about 850 feet. The bottom width of the pilot channel will be designed to match the width of the notch at the base of dam – approximately 20 feet wide. Twenty-foot channel width approximates the same current width of York Creek upstream and downstream from the dam and reservoir.

The pilot channel will be created with a uniform channel slope (5.7 percent -- estimated as roughly the same as the valley slope). Alluvial channels such as York Creek often have slopes less than valley slope once they have reached a state of dynamic equilibrium, which typically occurs through the development of channel sinuosity, via erosion of the channel banks and deposition of sediment in point bars and mid-channel bars. By setting initial conditions of a straight channel roughly the same gradient as the valley, it is anticipated that the pilot channel will tend to erode into its steep banks, which will be graded to a slope of 1.5 to 1 (horizontal to vertical), which is approximately the angle of repose of the sediment behind the dam. The pilot channel will incise into the sediment, eventually decreasing its slope to an equilibrium value based on local physical controlling features. Woody debris and large rocks removed from the excavation area will be retained and used to create habitat features in York Creek. Transport of impounded sediment is expected to begin immediately after surface streamflow returns following construction (Stillwater Sciences 2020).

In the pilot channel, the City proposes to construct six trenches perpendicular to anticipated streamflow. The trenches will be about 2 feet deep and 3 feet wide, and span the pilot channel. These trenches will be filled with small woody material, primarily from red willow (*Salix laevigata*) and California bay laurel (*Umbellularia californica*) cleared from the reservoir prior to sediment excavation. The trenches and the contained woody material will not be stabilized,

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prepared by WRA (2020b) estimates 15,000 CY of sediment will remain, whereas the Upper York Creek Dam Removal Sediment Transport Modeling, April 2020 Addendum prepared by Stillwater Sciences (2020) estimates 4,000 CY. The two documents present different volumes because different methods were used for estimating the volume of sediment available to be transported post-construction. WRA (2020b) calculated the volume of transportable sediment by estimating the volume of sediment between three surfaces: 1) the existing topography, 2) the upstream face of the dam, and 3) an assumed stable future channel topography that included a floodplain extending from the tops of the channel banks to the toes of slopes of the hillslope to the south and Spring Mountain Road to the north. Stillwater Sciences (2020) calculated the volume of transportable sediment by modeling the expected channel geometry through fluvial transport of York Creek. Stillwater Science's method is not dependent on the total volume of sediment at the project site. In this opinion, we use the estimate of transportable sediment from Stillwater Sciences (2020), as its methodology considered the hydrology of York Creek and the potential of the stream to mobilize sediment, whereas WRA (2020b) calculated total accumulated sediment and assumed that all of that sediment was likely to transport down York Creek.

other than burying them with coarse sediment. The finished grade in the pilot channel area will be uniform throughout the site.

1.3.4 Installation of Habitat Enhancement Structures

The City proposes to construct 36 structures using logs, rootwads, and other woody material downstream from the dam in York Creek. While the majority of the large wood structures will be placed in the channel, large portions of the logs (*e.g.*, 10-20 linear feet) will be placed onto the floodplain. These structures are designed to improve aquatic and riparian habitat conditions by providing cover, forage, variations in hydrodynamics, and sediment-sorting retention. The large wood structures begin about 100 feet downstream from the dam and continue downstream for about 3,000 feet. The specific locations of the large wood structures are identified in the Project's 100 percent design plans (WRA 2020c). Each site for the large wood structures was identified in the field and was based on existing in-channel woody materials, living trees on channel banks, and existing boulders and bedrock outcrops, as well as constraints posed by channel bank geometry, active landslides, designated cultural resource protection areas, and site accessibility.

Log structures have been designed to create pools, activate off-channel and side-channel floodplain habitat, and retain and sort coarse sediments transporting from upstream. The structures will vary in size and create diverse habitat within the channel and on the floodplain. Logs used for the structures will be those harvested from the construction site and imported from local and/or permitted tree harvest areas. Acceptable species for imported logs are Douglas-fir (*Pseudotsuga menziesii*) and coast redwood (*Sequoia sempervirens*). Logs will have stem length greater than 25 feet, which is a typical bankfull width of this portion of York Creek. All logs imported from off-site will be treated using heat to reduce the risk of spreading *Phytopthora*, a plant pathogen that may lead to sudden oak death and other plant diseases.

Disturbance of soils and features on existing adjacent floodplains, hillslopes, creek banks, and vegetation from construction of the large wood structures will be kept to a minimum by using rubber-tired equipment such as a skidder and backhoe, as opposed to tracked excavators. Hand crews are expected to assist with positioning the logs using equipment such as pulleys and winches.

York Creek will not be dewatered in the areas where the large wood structures will be constructed. Heavy equipment will avoid operating within the creek bed to reduce turbidity and disturbance to the aquatic environment. In order to minimize affects to fish and reduce the effects of buoyancy during construction, the log structures will be installed slowly in water no deeper than a few inches. No log structures will be installed in current pools, and the channel or banks will not be excavated to place the large wood structures. Piles of small woody material, harvested from on-site, will be placed in the channel bed, then logs will be placed and positioned atop that smaller material. Once properly positioned in the channel bed, the logs will be anchored to existing trees, boulders or bedrock using threaded rebar fasteners. No boulders will be imported for use as ballast. The specific work window for placement of large wood material in the stream to create the log structures is from July 1 to October 31, in order to minimize potential impacts to juvenile steelhead and other aquatic life.

1.3.5 Adaptive Management

To measure the response and evaluate the effectiveness of restoration actions related to the implementation of the Project, the City in coordination with the Napa County RCD has prepared the *Upper York Creek Ecosystem Restoration Project Geomorphic and Restoration Monitoring and Adaptive Management Plan* (Monitoring and Adaptive Management Plan) (Napa County RCD and WRA 2020). The Monitoring and Adaptive Management Plan proposes to monitor the creek over a 10-year period and adaptively manage the system, if needed, to ensure that the Project's goals are achieved and no unintended adverse effects occur. The program will monitor, evaluate, and report on the Project's effectiveness as it relates to restoration and geomorphology. The City will monitor about 4.5 miles of York Creek from the confluence with the Napa River upstream to the likely natural end of anadromy, a bedrock falls in York Creek approximately 1.5 miles above the dam.

The Project is anticipated to have different effects on York Creek dependent on channel conditions. Therefore, the Monitoring and Adaptive Management Plan establishes five contiguous reaches of York Creek (i.e., Valley Floor, Alluvial Fan, Log Structures/Sediment Traps, Dam/Graded Channel/Stored Sediment, and Upstream Canyon), and identifies specific performance standards for each reach. Chapter 6 of the Monitoring and Adaptive Management Plan (Napa County RCD and WRA 2020) presents the Project's performance criteria by reach and potential adaptive management actions. Within Reach 4 (Dam/Graded Channel/Stored Sediment), performance criteria includes "readjusted channel slope that provides fish passage". If the monitoring program determines conditions are present that imped fish passage, adaptive management actions will be taken to determine the cause and develop corrective actions if project-related.

Proposed monitoring includes the following elements: (1) reconnaissance surveys to observe current conditions and identify if any immediate adaptive management actions are needed; (2) longitudinal profile and transects of channel geometry; (3) photo-monitoring at defined stations to document changes over time; (4) water quality monitoring; (5) fish presence and habitat use; and (6) vegetation surveys of replanted areas. For additional details on the proposed Monitoring and Adaptive Management Plan, please see Napa County RCD and WRA (2020).

1.3.6 Avoidance and Minimization Measures

The Project will implement best management practices to avoid and minimize temporary impacts from construction activities such as providing environmental awareness training to all contractor crew members; delineating work areas to minimize impacts to habitat beyond the work limit or to protect vegetation within the work area; conducting work from top of bank during the summer dry season; implementing measures to avoid contamination by *Phytophthora* or other plant pathogens; removing invasive plant species during construction and replanting with appropriate native plant species (grasses, shrubs, and trees); replacing any coast redwood trees removed at a 2:1 ratio; and implementing an approved storm water pollution prevention plan. All construction activities within the York Creek channel will be limited to the period between June 1 and October 31. Details for all proposed avoidance and minimization measures are presented in

Project's *Biological Assessment for the Upper York Creek Ecosystem Restoration and Aquatic Habitat Enhancement Project in St. Helena, Napa County, California,* January 2020 and Revised March 2020 (WRA 2020b).

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

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

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

2.1. Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "jeopardize the continued existence of" a listed species, which is "to engage in an action that reasonably 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 of critical habitat for CCC steelhead uses 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 conduct the assessment, NMFS examined an extensive amount of information from a variety of sources. Detailed background information on the biology and status of the listed species and critical habitat has been published in a number of documents including peer reviewed scientific journals, primary reference materials, and governmental and non-governmental reports. Additional information regarding the effects of the Project’s actions on the listed species in question, their anticipated response to these actions, and the environmental consequences of the actions as a whole was formulated from the aforementioned resources, and the following:

- Section 7 Biological Assessment for the Upper York Creek Ecosystem Restoration and Aquatic Habitat Enhancement Project in St. Helena, Napa County, California. Prepared by WRA, Inc., January 2020 and Revised March 2020.
- Basis of Design Memo for the Upper York Creek Ecosystem Restoration and Aquatic Habitat Enhancement Project. Prepared by WRA, Inc., March 9, 2020.
- Upper York Creek Ecosystem Restoration and Aquatic Habitat Enhancement Project 100% Plans. Prepared by WRA, Inc., March 2020.
- Upper York Creek Dam Removal Sediment Transport Modeling – Addendum. Prepared by Stillwater Sciences. April 2020.
- Geotechnical Engineering Study – Upper York Creek Ecosystem Restoration and Aquatic Habitat Enhancement Project. Prepared by WRECO; Project No. P19111. April 2020.
- Draft Geomorphic and Restoration Monitoring and Adaptive Management Plan for the Upper York Creek Ecosystem Restoration Project, Napa County. Prepared by Napa County Resource Conservation District and

WRA, Inc., May 5, 2020.

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' "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 function of the PBFs that are essential for the conservation of the species.

2.2.1 Listed Species

This biological opinion analyzes the effect of the proposed Project in St. Helena, California on CCC steelhead in York Creek. CCC steelhead are listed as threatened under the ESA (71 FR 834, January 5, 2006). The CCC steelhead distinct population segment (DPS) includes steelhead in coastal California streams from the Russian River to Aptos Creek, and the drainages of Suisun Bay, San Pablo Bay, and San Francisco Bay. In addition, this biological opinion analyzes the effects on designated critical habitat for threatened CCC steelhead (September 2, 2005; 70 FR 52488). York Creek downstream from the York Creek Dam is designated critical habitat for CCC steelhead.

2.2.2 Steelhead Life History

Steelhead are anadromous fish, spending some time in both fresh- and saltwater. The older juvenile and adult life stages occur in the ocean, until the adults ascend freshwater streams to spawn. Eggs (laid in gravel nests called redds), alevins (gravel dwelling hatchlings), fry (juveniles newly emerged from stream gravels), and young juveniles all rear in freshwater until they become large enough to migrate to the ocean to finish rearing and maturing to adults. General reviews for steelhead in California document much variation in life history (Shapovalov and Taft 1954, Barnhart 1986, Busby *et al*. 1996, McEwan 2001). Although variation occurs in coastal California, steelhead usually live in freshwater for 1 to 2 years in central California, then spend 2 or 3 years in the ocean before returning to their natal stream to spawn. Steelhead may spawn 1 to 4 times over their life. Adult steelhead returning from the ocean to the Napa River watershed, including York Creek, typically immigrate to freshwater between December and April, peaking in January and February, and juveniles migrate as smolts from the watershed to the ocean from January through June, with peak emigration occurring in April and May (Fukushima and Lesh 1998).

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

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

2.2.3 Status of CCC Steelhead

Historically, approximately 70 populations of steelhead are believed to have existed in the CCC steelhead DPS (Spence *et al*. 2008). Many of these populations (approximately 37) were independent, or potentially independent, meaning they historically had a high likelihood of surviving for 100 or more years absent anthropogenic impacts (Bjorkstedt *et al*. 2005). The remaining populations were dependent upon immigration from nearby CCC steelhead DPS populations to ensure their persistence (McElhaney *et al*. 2000, Bjorkstedt *et al*. 2005). While historical and current data of abundance are limited, CCC steelhead DPS numbers are substantially reduced from historical levels. A total of 94,000 adult steelhead were estimated to spawn in the rivers of this DPS in the mid-1960s, including 50,000 fish in the Russian River – the largest population within the DPS (Busby *et al*. 1996). Near the end of the 20th century, McEwan (2001) estimated that the wild steelhead population in the Russian River watershed was between 1,700 and 7,000 fish. Abundance estimates for smaller coastal streams in the DPS indicate low but stable levels, with recent estimates for several streams (Lagunitas, Waddell, Scott, San Vicente, Soquel, and Aptos creeks) of individual run sizes of 500 fish or less (62 FR 43937). However, as noted in Williams *et al*. (2016) data for CCC steelhead populations remain scarce outside of Scott Creek, which is the only long-term dataset and shows a significant decline. Short-term records indicate the low but stable assessment of populations is reasonably accurate; however, it should be noted that there is no population data for any populations outside of the Santa Cruz Mountain stratum, other than hatchery data from the Russian River.

Although available time series data sets are too short for statistically robust analysis, the information available indicates CCC steelhead populations have likely experienced serious declines in abundance, and apparent long-term population trends suggest a negative growth rate.

This would indicate the DPS may not be viable in the long term, and DPS populations that historically provided enough steelhead immigrants to support dependent populations may no longer be able to do so, placing dependent populations at increased risk of extirpation. However, because CCC steelhead have maintained a wide distribution throughout the DPS, roughly approximating the known historical distribution, CCC steelhead likely possess a resilience that could slow their decline relative to other salmonid DPSs or Evolutionary Significant Units in worse condition. The 2005 status review concluded that steelhead in the CCC steelhead DPS remain "likely to become endangered in the foreseeable future" (Good *et al.* 2005), a conclusion that was consistent with a previous assessment (Busby *et al.* 1996) and supported by the NMFS Technical Recovery Team work (Spence *et al.* 2008). On January 5, 2006, NMFS issued a final determination that the CCC steelhead DPS is a threatened species, as previously listed (71 FR 834).

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

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

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

2.2.4 CCC Steelhead Critical Habitat Status

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

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

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
2. Freshwater rearing sites with:

    a. water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
    b. water quality and forage supporting juvenile development; and
    c. natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
3. Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

The condition of CCC steelhead critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that present depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat: logging, agricultural and mining activities; urbanization; stream channelization; dams; wetland loss; and water withdrawals, including unscreened diversions for irrigation. Impacts of concern include alteration of streambank and channel morphology, alteration of water temperatures, loss of spawning and rearing habitat, fragmentation of habitat, loss of downstream recruitment of spawning gravels and large woody debris, degradation of water quality, removal of riparian vegetation resulting in increased streambank erosion, loss of shade (higher water temperatures) and loss of nutrient inputs (Busby *et al*. 1996, 70 FR 52488, NMFS 2016a). Water development has drastically altered natural hydrologic cycles in many of the streams in the DPS. Alteration of flows results in migration delays, loss of suitable habitat due to dewatering and blockage; stranding of fish from rapid flow fluctuations; entrainment of juveniles into poorly screened or unscreened diversions, and increased water temperatures harmful to salmonids. Overall, current condition of CCC steelhead critical habitat is degraded, and does not provide the full extent of conservation value necessary for the recovery of the species.

A final recovery plan for CCC steelhead was prepared by NMFS in October 2016 (NMFS 2016a). The plan describes key threats, actions needed to achieve recovery, and measurable criteria by which NMFS will determine when recovery has been reached. Recovery plan actions are primarily designed to restore ecological processes that support healthy steelhead populations, and address the various activities that harm these processes and threaten the species' survival. The recovery plan calls for a range of actions including the restoration of floodplains and channel structure, restoring riparian conditions, improving streamflows, restoring fish passage, protecting and restoring estuarine habitat, among other actions. Several recovery actions linked specifically to York Creek, including removal of York Creek Dam, appear in the recovery plan for CCC steelhead (Table 1).

2.2.5. Global Climate Change

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

The threat to CCC steelhead from global climate change will increase in the future. Modeling of climate change impacts in California suggests that average summer air temperatures are expected to continue to increase (Lindley *et al*. 2007, Moser *et al.* 2012). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe *et al.* 2004, Moser *et al.* 2012, Kadir *et al.* 2013). Total precipitation in California may decline; critically dry years may increase (Lindley *et al.* 2007, Schneider 2007, Moser *et al.* 2012). Wildfires are expected to increase in frequency and magnitude (Westerling *et al*. 2011, Moser *et al.* 2012).

In the San Francisco Bay region, warm temperatures generally occur in July and August, but as climate change takes hold, the occurrences of these events will likely begin in June and could continue to occur in September (Cayan *et al.* 2012). Climate simulation models project that the San Francisco region will maintain its Mediterranean climate regime, but experience a higher degree of variability of annual precipitation during the next 50 years and years that are drier than the historical annual average during the middle and end of the 21st Century. The greatest reduction in precipitation is projected to occur in March and April, with the core winter months remaining relatively unchanged (Cayan *et al.* 2012).

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

2.3. Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for the Project consists of the streambed and banks of York Creek from the upstream extent of construction (*e.g.*, upper cofferdam) downstream to the confluence of York Creek with the Napa River, a distance of approximately 2.7 miles. The action area contains the area of Project construction, staging area, cofferdams, streambed area to be dewatered, potential fish relocation sites, and the portion of York Creek in which any temporary disruption to habitat (*e.g.*, fine sediment plume) might be detectable.

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).

York Creek is a perennial tributary to San Francisco Bay, via the Napa River. York Creek, within the action area, is located within a narrow canyon and is a stream of moderate gradient (WRA 2020b). Near the western St. Helena city limits, the canyon opens and the gradient eases, and York Creek transitions to an alluvial, low-gradient stream. The channel sinuosity is constrained by suburban and agricultural development. The climate within the action area is Mediterranean and receives about 35 inches of precipitation annually, with about 90 percent of annual precipitation occurring between November and April.[2] Cool fog in the mornings is common during the late spring and summer, and significant rainfall during that time is rare.

WRA (2020a) describes that plant community within the construction portion of the action area as containing four general habitats: Coast redwood forest; Douglas-fir dominant mixed forest; riparian woodland dominated by white Alder (*Alnus rhombifolia*) and various willows (*Salix* sp.); and ruderal vegetated area. Observations of plants indicate a well-vegetated mosaic of native trees, shrubs, and forbs; however, there are some nonnative plants present. With increasing distance downstream, urban encroachment increases, riparian vegetation narrows, and there are changes in riparian species composition.

2.4.1 Status of Steelhead and Critical Habitat in the Action Area

Steelhead are native to and present in York Creek. Previous surveys and sampling of steelhead in York Creek indicates steelhead spawn in York Creek (Napa County RCD 2013) and that three year-classes of juvenile steelhead will likely be present in York Creek during any year (Prunuske Chatham 2004, Leidy *et al.* 2005, Napa County RCD 2005). Densities of juvenile steelhead have not been consistently measured or reported. NMFS (2004) and Leidy *et al.* (2005) reviewed earlier reports of observations of steelhead from York Creek. Comparison among those previous reports are challenging, as the surveys used varied gear types and locations, reported metrics differently, and sampling was conducted in various years. Estimates of juvenile steelhead abundance in York Creek from those earlier accounts range from 0.1 to 4.0 juvenile steelhead per linear foot of stream surveyed. Within the action area, York Creek supports steelhead migration, spawning, egg incubation, and juvenile rearing. Given the proposed

[2] weatherbase.com, USClimateData.com, en.Climate-Data.org, and NOAA's National Weather Service.

construction period for the Project (*i.e.*, June 1 through October 31), only juvenile steelhead are expected to be present in the action area during construction activities.

Based on current stream and riparian conditions, designated critical habitat within the action area is moderately degraded from properly functioning condition due to impacts from land use in the watershed (NMFS 2016a). York Creek Dam has interrupted passage of coarse sediment to downstream areas for more than 100 years, though fine sediment can continue to pass the dam through the outlet pipe (Stillwater Sciences 2018a). Periodically the City would excavate and off haul the impounded sediment to regain reservoir volume.

With transport of coarse sediment interrupted by the presence of York Creek Dam, the streambed downstream from the dam has changed markedly. The gravels, essential to steelhead spawning success, remnant from before York Dam was constructed, have continued to migrate downstream without being replenished from upstream areas. Under current conditions, areas of spawning gravel in York Creek downstream from the dam are lacking (WRA 2020d). Also, the bed elevation of the channel has degraded. To confound matters, the water passing York Creek Dam, when allowed, passes through a drop inlet and receiving culvert, or, when flows are sufficiently high to overwhelm the drop inlet, passes in one of two steep concrete-lined bypass channels. The water flowing through the culvert or bypass channels is travelling at a faster velocity than water traveling in the natural channel of York Creek and results in higher erosive forces on the bed and bank leading to further degradation of the channel bed. The resulting "incised" channel downstream from the dam fails to create and maintain aquatic and riparian features that support high-quality steelhead habitat.

For a distance of about 3,000 feet downstream from the dam, York Creek's incised channel has a narrow floodplain. Although this floodplain area contains some valuable habitat features that create refuge for steelhead from high flows and additional feeding opportunities, these habitat features are available to steelhead infrequently under current conditions due to channel incision. Winter rearing habitat conditions for steelhead in York Creek is poor, as velocity refuge and floodplain feeding opportunities are lacking. With diminished lateral migration and disconnected flow, natural processes and channel functions of York Creek and its adjacent floodplain are impaired. As a result, York Creek, downstream from the dam, has reduced food production and less functional habitat for summer and winter rearing steelhead.

2.4.2 Factors Affecting Species Environment in the Action Area

Upstream from the York Creek Dam, the watershed is mixed forests and ridgetop vineyards (WRA 2020d). In the vicinity of the dam, the stream is constrained in a relatively narrow canyon and heavily forested. Beginning about one mile downstream from the dam, rural residences and suburban development encroaches on the channel of York Creek.

Construction of York Dam in 1900 has affected CCC steelhead and their habitat since that time. The dam itself blocks adult steelhead from accessing approximately 1.5 miles of high-quality steelhead spawning and juvenile rearing habitat in upper York Creek. The dam also interrupts bedload transport and this loss of coarse sediment input to lower York Creek has degraded channel conditions below the dam. Additionally, the dam and reservoir has altered streamflow and water quality conditions downstream from the dam.

Emig (1992) summarizes information regarding four fish kills attributed to discharges of sediment and toxic water from York Creek Dam. Reported fish kills occurred in the summers of 1965, 1973, 1975, and 1992. The 1992 fish kill was attributed to failures of a valve or cribbing protection during maintenance at York Creek Dam allowing discharges of sediment and toxic water to York Creek. In 1992, dead fish and deposits of fine sediment were reported to extend from the dam to the confluence of the Napa River. Information regarding the causes of the three previous fish kills was not provided by Emig (1992).

The construction and continued presence of York Creek Dam has resulted in significant changes to the downstream channel of York Creek. As described above, the majority of changes to the channel have been caused by the interception the natural coarse sediment delivered from the upper watershed, though fine sediment passes the dam during high flow events. Periodically (every 5-10 years), based on precipitation amounts, the City excavates and off-hauls the coarse sediment deposits trapped in the reservoir basin immediately upstream from York Creek Dam. Downstream from the dam, small to medium sediments within the channel are scarce, thereby limiting steelhead spawning opportunities. Also, the stream downstream from the dam is incised with steep banks and perched, abandoned floodplains (WRA 2020a). There are few connected secondary channels and backwater areas, and large pieces of wood and undercut banks are lacking. These factors have reduced the amount of refugia from predators and high-velocity flow events. A small amount of instream cover is provided by small boulders or large cobbles.

In addition to York Creek Dam and Reservoir, the City owned and operated a 12-foot high water diversion dam about 0.75 miles downstream from York Creek Dam. This dam captured water released from York Creek Reservoir when the City's facilities were operated for water supply. At most streamflow conditions, this diversion dam was a complete barrier to upstream fish passage. With the filling of York Creek Dam with sediment, the City ceased operation of their facilities for water supply during the 1970s. In 2004, the City removed this diversion dam (see Section 2.4.3 of this opinion for more details regarding removal of the diversion dam.)

Downstream from the construction area, York Creek flows through vineyards and suburban development. Suburban and agricultural development adjacent to the creek has contributed to increased erosion, channel simplification, chemical toxicity from stormwater discharges, and concentrated surface runoff following precipitation events. Within the city limits of St. Helena, York Creek has been channelized and rerouted from its historical alignment. The Coastal Multispecies Recovery Plan (NMFS 2016a) indicates instream habitat conditions for steelhead in York Creek have been reduced to poor quality.

2.4.3 Previous Section 7 Consultations Affecting the Action Area

In 2004, NMFS and the Corps completed a formal section 7 consultation related to the City's removal of a water diversion dam from York Creek. The diversion dam was built in 1900 and used for municipal water supply by the City. The rock and masonry structure was a fish passage impediment spanning the entire width of the channel about ¾ of a mile downstream from the York Creek Dam. To restore fish passage, the City cut a trapezoidal notch in the dam and constructed a series of boulder weirs downstream. To provide a new method for water diversion, the City installed a subterranean infiltration gallery with an off-channel diversion sump.

Construction of the project required dewatering of about 120 linear feet of York Creek during the summer of 2004. NMFS issued a biological opinion to the Corps for the project on April 15, 2004 (ARN #151422SWR2004SR08926). NMFS concluded that the project was not likely to jeopardize the continued existence of CCC steelhead or result in the destruction or adverse modification of designated critical habitat.

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

Section 10(a)(1)(A) research and enhancement permits and section 4(d) limits or exceptions could potentially occur in the York Creek watershed, including the action area of this Project. Salmonid monitoring approved under these programs includes carcass surveys, smolt outmigration trapping, and juvenile density surveys. In general, these activities are closely monitored and require measures to minimize take during the research activities. No research or enhancement activities authorized through Section 10(a)(1)(A), have occurred in the York Creek watershed. The Napa County RCD has a section 4(d) authorization for sampling steelhead in York Creek and surrounding streams in the Napa river watershed.

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).

2.5.1 Fish Relocation Activities

Fish collection and relocation will be performed in coordination with dewatering prior to construction. The dewatered portion of York Creek within the action area will be the entire wetted surface for approximately 1,000 linear feet. Between 100-150 feet of the dewatered portion will be located downstream from the dam and in areas currently accessible to steelhead. The remainder of the channel to be dewatered consists of the dam itself and York Creek upstream from the dam. With the dam currently functioning as a complete barrier to upstream passage, CCC steelhead will only be present in the area downstream from the dam. The City proposes to collect and relocate fish to minimize the effects of dewatering the stream. Before and during dewatering of York Creek within the construction area, juvenile steelhead and other fish will be captured and relocated away from the work area to avoid direct mortality and minimize the possible stranding of fish in isolated pools. Fish within the area to be dewatered will be captured using electrofishing or dip nets and seines, and then transported and released by a qualified fisheries biologist to suitable instream locations in York Creek outside the work area.

All steelhead present in the area to be dewatered will need to be relocated or they will perish when the work area is dewatered. Steelhead relocation activities will occur during the summer and early fall low-flow period after emigrating smolts and kelts (post-spawned adults) have left the creek and prior to the adult migration and spawning season. Therefore, NMFS expects the CCC steelhead that will be captured during this project will be limited to pre-smolting juveniles. Previous sampling of steelhead in York Creek indicates that three year-classes of steelhead will be likely present during the summer and fall months (NMFS 2004, Prunuske Chatham 2004, Leidy *et al.* 2005, Napa County RCD 2005).

Data to precisely quantify the number of steelhead that will be relocated by the Project prior to construction are not available, but estimates can be made from available information. In 2004 the City removed a diversion dam from York Creek about ¾ of a mile downstream from York Dam. To remove the diversion dam, 120 linear feet of York Creek was dewatered and 64 juvenile steelhead from three year-classes were captured and relocated (Prunuske Chatham 2004). We assume that the dewatered portion of York Creek, accessible to steelhead, will have a similar abundance of steelhead as found during the demolition of the former diversion dam. Prunuske Chatham (2004) reported juvenile steelhead density of about 54 fish per 100 feet of dewatered channel. Allowing for a 50 percent variation in inter-annual population abundance and allowing for up to 150 feet of channel below York Dam to be dewatered, up to 122 juvenile steelhead may be collected. This is expected to be the maximum number of CCC steelhead that would be captured and relocated by the Project during construction.

Fish relocation activities pose a risk of injury or mortality to rearing juvenile salmonids. Any fish collecting gear, whether passive (Hubert 1996) or active (Hayes *et al*. 1996) has some associated risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish capture varies widely, depending on the method used, the ambient conditions, and the expertise and experience of the field crew. Since fish relocation activities by the Project will be conducted by qualified fisheries biologists, direct effects to and mortality of juvenile steelhead during capture will be minimized. Based on information from other relocation efforts in California, NMFS estimates injury and mortalities would be less than three percent of those steelhead that are captured and relocated (Collins 2004, CDFG 2005, 2006, 2007, 2008, 2009, 2010a, 2010b, NMFS 2016b). Fish that avoid capture during relocation efforts may be exposed to risks described in the following section on dewatering. NMFS expects no more than three percent of the steelhead captured by the Project for dewatering will be injured or killed during relocation activities. Given that we anticipate the capture of 122 juvenile steelhead during this construction project, we expect no more than 4 juvenile steelhead are expected to be injured or killed during fish relocation and dewatering activities.

Sites selected in York Creek for relocating fish should are expected to have similar and ample aquatic habitat as in the capture sites. In some instances relocated fish may endure short-term stress from crowding at the relocation sites. Relocated fish may have to contend with other fish causing increased competition for available resources such as food and habitat area. Frequent responses to crowding by steelhead include emigration and reduced growth rates (Keeley 2003). Some of the fish released at the relocation sites may choose not to remain in these areas and move either upstream or downstream to areas that have more vacant habitat and a lower density of steelhead. As each fish moves, competition remains either localized to a small area or quickly diminishes as fish disperse. NMFS does not expect impacts from increased competition would be large enough to adversely affect the survival chances of individual steelhead, or cascade through the watershed population based on the small area that would likely be affected and the relatively small number of individuals likely to be relocated (particularly when compared with the remainder of individuals throughout the drainage not affected by the project). As described above, sufficient habitat appears to be available in York Creek to sustain fish relocated without crowding of other juvenile steelhead. Once construction activities are completed in the late fall, juvenile steelhead will have the ability to return to the previously dewatered portion of the action area and potentially to newly accessible habitat in York Creek upstream from the former dam.

2.5.2 Dewatering

The Project proposes to isolate work areas with a cofferdam and bypass streamflow around the construction area. Bypass piping will be installed to divert streamflow from upstream the construction area to below the construction area by gravity, a distance of approximately 1,000 linear feet of York Creek. NMFS anticipates only minor temporary changes to the streamflow of creek outside of the dewatered construction area during the dewatering process. These fluctuations in flow are anticipated to be small, gradual, and short-term. Once the cofferdam and pipeline bypass are installed and operational, streamflow above and below the work area should be the same as the pre-project conditions except within the dewatered work areas where streamflow is bypassed. The dewatering of up to 1,000 feet of channel is expected to cause a temporary reduction in the quantity of aquatic habitat. However, only 100-150 linear feet of the 1,000-foot long channel to be dewatered is downstream from the York Creek Dam where steelhead currently reside below the dam.

Juvenile steelhead that avoid capture in the project work area following relocation efforts may die due to desiccation, thermal stress, or by being crushed by equipment or foot traffic if not found by biologists as water levels recede within the area being dewatered. However, due to fish relocation efforts, NMFS expects the number of juvenile steelhead that would die as a result of stranding during dewatering activities would be one percent or less of the steelhead within the work site prior to dewatering rounded up to the next whole number. NMFS anticipates 122 juvenile steelhead in the dewatered portion of York Creek; therefore, NMFS expects no more than 2 juvenile steelhead will avoid capture during relocation efforts and die.

The temporary cofferdams and water diversion structures in the creek at the construction site are not expected to impact juvenile steelhead movements in York Creek with the exception of the small area (100-150 linear feet) to be dewatered downstream of the dam. The remaining 850-900 linear feet of York Creek to be dewatered is upstream of the existing dam, a feature that has blocked the upstream movement of steelhead in the action area for more than 100 years. The low flow season timing of the Project's construction activities combined with the small portion of habitat accessible to steelhead (100-150 linear feet) to be dewatered, the placement of cofferdams and streamflow bypass diversion during the 4-month construction period are unlikely to adversely affect movements of individual steelhead in York Creek.

Benthic (*i.e.*, bottom dwelling) aquatic macroinvertebrates (a salmonid prey item) within the construction site may be killed or their abundance reduced when creek habitat is dewatered (Cushman 1985). However, effects to aquatic macroinvertebrates resulting from the construction streamflow bypass and dewatering will be temporary because construction activities would be relatively short-lived and the dewatered area is relatively small (approximately 1,000 linear feet of channel total). Rapid recolonization (typically one to two months) of disturbed areas by macroinvertebrates is expected following channel re-watering (Cushman 1985, Thomas 1985, Harvey 1986). Based on the foregoing, NMFS does not expect the temporary loss of aquatic macroinvertebrates as a result of dewatering activities by the Project would adversely affect CCC steelhead during or after project implementation.

2.5.3 Placement of Large Wood Structures

The City proposes construction of up to 36 large wood structures in York Creek extending from the dam site downstream for a distance of approximately 3,000 linear feet. The large wood structures will be constructed primarily within the channel, though sizeable proportions will extend onto the floodplain. Construction of the large wood structures will occur without dewatering the stream. The structures will be constructed at discrete locations where only a small, localized area will be affected. Tractors and pulley systems will allow careful and slow placement of the wood materials in shallow portions of the stream and no large wood structures will be placed in any pools.

Steelhead usually are not distributed uniformly at all depths within a stream, rather they demonstrate preferences depending on the time of year, size of the fish, and presence of other species (Barnhart 1986, Bjornn and Reiser 1991, Holmes *et al*. 2014). Further, the depth at which juvenile steelhead are found is affected by the perceived threat from predators and they will flee areas when in danger (Bjornn and Reiser 1991). Workers operating equipment and positioning wood materials along the bank and in shallow areas within the wetted perimeter of the stream are expected to create a level of disturbance that will cause juvenile steelhead to flee the local work sites. Steelhead fry preferred shallow edge stream habitat and then move into deeper water within a couple months when transitioning to parr (Holmes *et al*. 2014). With the timing of large wood installation scheduled for July 1 through October 31, juvenile steelhead are expected to be of sufficient age and size to seek refuge in pool areas adjacent to work sites with elements of structure and cover to hide. Any juvenile steelhead that do not leave the immediate area when wood structures are constructed may be injured or killed. If juvenile fish seek cover within the gravel/cobble bed of the creek or under vegetation, they could be injured or killed when the bed of York Creek is compacted by workers wading in the channel and wood placements. The majority of juvenile steelhead are expected to vacate work sites to areas of safety in adjacent pools; however, over the course of installing 36 structures, a small unknown number of juvenile steelhead could be injured or killed during these construction activities.

2.5.4 Increased Sediment Mobilization in the Stream Channel and Resulting Water Quality During 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). During construction of this project, proposed activities would result in disturbance of the creek bed and banks for equipment access, dam notching, channel contouring, placement of large wood structures, and placement/removal of the cofferdams. While the cofferdams and streamflow bypass system are in place, construction activities are not expected to degrade water quality in York Creek because the work area will be dewatered and isolated from the flowing waters of the creek. Immediately following construction, NMFS anticipates disturbed sediment or soils could affect water quality and critical habitat in the action area in the form of small, short-term increases in turbidity during re-watering (*i.e*., cofferdam removal).

Although chronic elevated sediment and turbidity levels may adversely affect steelhead, the Project has proposed several measures to avoid the discharge of sediments during construction and proposes channel stabilization measures post-construction. Silt curtains, erosion control fabric, planting of native vegetation, and hydroseeding disturbed riparian areas will be deployed. Excavation of up to 12,140 CY of sediment from the reservoir basin and the creation of a notch/pilot channel are not expected to affect water quality in York Creek downstream of the dam due to the use of cofferdams. With implementation of these measures, NMFS anticipates there will be minimal area of disturbed, exposed soils remaining post-construction. Therefore, any resulting elevated turbidity levels associated with construction activities would be minor, only occur for a short period, and be well below levels and durations shown in the scientific literature as causing injury or harm to salmonids (see for example Sigler *et al.* 1984 or Newcombe and Jensen 1996). NMFS expects any sediment or turbidity generated by construction activities would not extend more than 150 feet downstream of the work sites based on the site conditions and methods used to control sediment. NMFS does not anticipate harm, injury, or behavioral impacts to CCC steelhead associated with exposure to the minor elevated suspended sediment levels that would be generated by the Project's construction disturbance.

2.5.5 Mobilization of Impounded Sediments and Resulting Water Quality Post-Construction

Post-construction, an estimated 4,000 CY of impounded coarse sediments will remain in the area of the former reservoir to be transported downstream by winter flow events over time. These materials are expected to mobilize with the return of seasonal storm flow and pass downstream through the newly created notch in the dam. Stillwater Sciences (2018a, 2020) modeled sediment transport and suspended sediment concentration scenarios after dam removal and the onset of erosion of the remaining impounded material. To account for the annual variation possible in rainfall and runoff from storm events following dam removal, sediment transport was modeled in wet, median and dry years. The modeling was based on past water years that represent exceedance probabilities for annual runoff and annual maximum daily average discharge. In addition to the water year variation, factors including the timing of the onset of winter rainfall, the magnitude of storm events that occur, and the timing of steelhead spawning all can be expected to influence the effects sediment levels in the stream have on steelhead below the dam.

Sediment may affect salmonids in several ways. High concentrations of suspended sediment can disrupt normal feeding behavior and efficiency (Cordone and Kelly 1961, Bjornn *et al*. 1977, Berg and Northcote 1985), reduce growth rates (Crouse *et al.* 1981), and increase plasma cortisol levels (Servizi and Martens 1992). High and prolonged turbidity concentrations can lower dissolved oxygen in the water column, reduce respiratory function, lower disease tolerance, and even cause fish mortality (Sigler *et al*. 1984, Berg and Northcote 1985, Gregory and Northcote 1993, Velagic 1995, Waters 1995). Even small pulses of turbid water may cause salmonids to disperse from established territories (Waters 1995), which can displace fish into less suitable habitat and/or increase competition and predation, decreasing survival. In addition, increased sediment deposition can fill pools and reduce the amount of cover available to fish, decreasing the survival of juvenile salmonids (Alexander and Hansen 1986).

Impounded sediments remaining in the former reservoir basin will be mobilized during high streamflow events following Project construction and modeling performed by Stillwater Sciences (2018a, 2020) indicates the impounded sediment will erode rather quickly. Stillwater Sciences' DREAM-2 model show mobilization of impounded sediments will occur in the first large storms, and the wave of coarse bed sediment moving downstream to the Napa River is likely to take two to six weeks, unless the winter following construction is a dry year and then it may take approximately one year. During construction the Project will contour the sediment remaining within the former reservoir basin to form a pilot stream channel leading to the notch in the dam. With winter rainfall events, channel incision and lateral channel migration through the impounded sediments will occur and streamflow will refine the constructed pilot channel to sculpt a natural creek bed and floodplain. A state of equilibrium in the channel through the former reservoir basin and the dam's notch is expected to occur within the first winter following Project completion. Thus, the creek's physical response to dam removal and the associated temporary pulse of impounded sediment moving downstream through the system may vary, but is not expected to extend beyond one year (Stillwater Sciences 2018a, 2020). If a dry winter with no significant precipitation events follows construction, the effects of mobilized impounded sediments would be delayed until rainfall returns to the watershed.

Turbidity and suspended sediment levels downstream of the former reservoir are anticipated to be elevated above natural background levels as the creek makes its initial adjustments to the new channel morphology and sediment transport out of the reach equals sediment input. However, given the generally coarse composition of the impounded sediments remaining in the reservoir, increases in suspended sediment concentration are expected to be limited to the initial high winter flow events following construction (Stillwater Sciences 2018a, 2020). The pulses of suspended sediment are expected to quickly dissipate following rainfall events, with the highest suspended sediment levels (up to 10^4 mg/L) occurring in a brief period following the first significant storm of the winter season after construction (Stillwater Sciences 2018a). Model simulations predict that after the maximum suspended sediment concentration passes, subsequent peak concentrations are on the order of 10^2 mg/L. The results of sediment transport modeling and hydraulic analysis concluded dam removal will result in short-term (generally less than 2 weeks) increase in suspended sediment concentration and subsequent levels are expected to be within the maximum range experienced under current conditions (Stillwater Sciences 2018a and 2020).

The biological assessment prepared by WRA (2020b) concluded that significant adverse effects to steelhead adults, embryos, and alevins may occur due to high levels of turbidity and suspended sediment associated with the transport of impounded sediment during the first year following construction. Although adverse effects to steelhead are expected from the mobilization of impounded sediments, the WRA analysis assumed the transport of up to 15,000 CY, rather than the 4,000 CY of sediment estimated by Stillwater Sciences (2020). Furthermore, WRA failed to take into account that adult steelhead returning to York Creek do not have access until at least one or two significant precipitation events have occurred because surface flow in the lowermost reaches of York Creek is seasonal and typically dry during the summer/fall months. In most years, rainfall in October, November, and December precede the arrival and spawning by adult steelhead, which typically peaks in January, February and March (Fukushima and Lesh 1998). Adult steelhead cannot enter York Creek to access the spawning habitat until sufficient surface streamflow is present and they are unlikely to be present during the first high flow events following construction. However, juvenile steelhead age 1+ and 2+, are expected to be present in York Creek during the first significant streamflow events that mobilize the majority of remaining impounded sediments.

To assess the potential effects of steelhead exposure to high levels of turbidity, we utilized information developed by Newcombe and Jensen (1996). Newcombe and Jensen (1996) created a scale of severity for anticipated effects from suspended sediment concentration for various fish, including steelhead. Their severity scale runs from 0, no behavioral effects, to 14, greater than 80 percent mortality of the most sensitive individuals of a population. Based on modeling performed by Stillwater Sciences (2018a), the magnitude and duration of suspended sediment concentration expected in York Creek during the initial transport of impounded sediment (up to 10^4 mg/L) would lead to a 10 or 11 on Newcombe and Jensen's severity scale. For steelhead, settings with a severity score of 10 or 11 are expected to result in mortality rates ranging from 0 to 40 percent of the most susceptible individuals. Individuals that do not die, would likely experience high levels of turbidity and suspended sediment in the water column for several days which can result in sub-lethal impacts. Highly turbid water can reduce feeding ability for fish, subject fish to gill injuries and physiological stress, and individuals may temporarily evacuate preferred habitat (Newcombe and Jensen 1996). All of the 1+ and 2+ steelhead in York Creek during the first winter following construction will be exposed to several days of high suspended sediment concentration occurring with the first pulses of transporting sediments. Modeling by Stillwater Sciences (2018a, 2020) predicts elevated suspended sediment concentrations will extend from 3 to 7 days during the initial event that mobilizes impounded sediment. Based on the above, up to 40 percent of the juvenile steelhead in York Creek could be subject to mortality during the initial pulse of mobilized sediment and the balance of the juvenile steelhead population will be subjected to stress and sub-lethal effects for several days.

Although uncertain, adult steelhead could also be exposed to suspended sediment concentrations approaching the maximum peak level. If a high flow event that mobilizes the majority of impounded sediments occurs after adult steelhead have entered York Creek, these adults would also be subject to the stress and mortality described above for juvenile steelhead. However, this sequence of events has a low probability of occurence because the majority of impounded sediments will be mobilized during the first substantial precipitation events of the season and these rainfall events typically occur prior to the immigration of CCC steelhead in the Napa River watershed. Furthermore, adult steelhead will not have access into York Creek from the Napa River until the seasonally dry reaches of the lower creek have sufficient streamflow for upstream passage. If the watershed experiences a moderate precipitation event that re-waters lower York Creek but does not create the initial high flow events that mobilizes the majority of impounded sediments, high levels of turbidity and suspended sediment could occur in the presence of adult steelhead.

If this hydrological condition did occur, the earliest adult steelhead returns to York Creek and their redds would be susceptible to the effects of the mobilized impounded sediments. Modeling results indicate sediment deposition in York Creek downstream from the dam following construction of the notch will be a transient phenomenon, and the deposition is expected to occur over a few weeks as long as there is reasonably high flow in the creek (Stillwater Sciences 2018a). As impounded sediments from the former reservoir basin work their way downstream, the sediment pulse from removal of the dam may fill riffle habitat used by spawning steelhead. The Project's biological assessment concludes spawning sites with incubating eggs and alevins could be subject to sediment deposition which may result in the mortality of eggs, alevins and fry in York Creek (WRA 2020b). Sediment accumulation within interstitial spaces in redds can constrict the flow of water to eggs and alevins which delivers dissolved oxygen and removes metabolic wastes.

Alternatively, the most likely scenario will be adult steelhead will immigrate and spawn in York Creek after the initial sediment mobilization flow events. Based on rainfall records for the City of St. Helena, the watershed receives between 12.3 and 13.4 inches of precipitation in October through December, which is about 37 percent of the annual rainfall.[3] Modeling predicts the majority of available sediment will transport on the first streamflow event of sufficient magnitude, and precipitation amounts between mid-October and the end of December are generally sufficient to trigger the transport of the impounded sediment remaining after construction. Thus, the effects described above on steelhead redds may not occur because the impounded sediment mobilization and maximum peak suspended sediment concentration are expected to occur prior to steelhead spawning in York Creek. Stillwater Sciences' DREAM-2 modeling results (Stillwater Sciences 2018a) indicate sediment deposition will primarily occur in a short reach downstream of the dam, within the large wood structure placement reach, and in the lower creek where spawning conditions are generally poor. There will be some continuing erosion and sediment transport downstream during winter baseflows and subsequent high flow events, but turbidity and suspended sediment concentrations are expected to be within the maximum range experienced during typical winter storm flows in York Creek. Therefore, the risk of adverse effects of adult steelhead and redds is low; however there is the potential for a small number of the early run of adult steelhead and their redds to be subjected to the effects of the initial sediment pulse. With limited access into York Creek and the timing of the initial sediment pulse with the first significant precipitation events, NMFS estimates up to 10 percent of the adult steelhead returns to York Creek and their redds could be affected by high suspended sediment concentrations and mobilized sediments. The high estimate of 10 percent is based on the number of adults likely to arrive early in the migration season (i.e., November - December)

[3] weatherbase.com, USClimateData.com, en.Climate-Data.org, and NOAA's National Weather Service.

and would range from 0 to 3 adult fish, since the stream currently provides about 3 kilometers (km) of spawning and rearing habitat (Napa County RCD 2005) and a reasonable estimate of adult spawning density for York Creek is 10 adults per km. A February 2013 steelhead spawning survey conducted by the Napa County RCD observed five steelhead redds in the 2.6-km reach downstream of York Creek Dam (Napa County RCD 2013).

If the winter and spring following Project construction is dry and low streamflow conditions do not trigger the mobilization of impounded sediments, it is unlikely that adult steelhead would enter and spawn in York Creek. Sufficient flow volume is required in the lowermost reaches of the creek to provide for the upstream passage of adult steelhead. Without sufficient flow in York Creek, adult steelhead will likely spawn in the mainstem of the Napa River or another neighboring tributary stream with sufficient flow. The Napa County RCD has documented steelhead spawning in the mainstem Napa River most commonly during dry years when access to preferred tributary spawning habitat is limited by low streamflow (Napa County RCD 2016). Under these circumstances, the mobilization of impounded sediments and the associated effects on steelhead would be delayed until rainfall returns to the watershed.

The Project's construction of six trenches within the former reservoir basin will span the constructed pilot channel and the trenches are designed to deform as the sediment surrounding them erodes. Woody material placed inside the trenches are designed to provide temporary stabilization until the initial first winter storm event mobilizes the impounded sediment, at which point the woody material will float and transport downstream. Most of this woody material will wrack on the Project's large wood structures, and naturally occurring large wood and boulders in the channel. Red willow and California bay laurel can reproduce through cuttings, and likely, some of this wracked material finds conditions appropriate for growing into established trees that will supplement riparian vegetation, either in the location of the slash trench, or within the stream corridor downstream. The woody material from the trenches that does not survive will provide important ecosystem functions, such as cover for aquatic species, nesting material for avian species, and forage for macroinvertebrates.

As reported by Emig (1992), sediment discharges from York Creek Dam and Reservoir in 1965, 1973, 1975, and 1992 resulted in significant fish kills in York Creek. These events occurred under conditions that are not expected to re-occur following construction of this Project. The previous releases which resulted in fish kills occurred during the summer, a period of low discharge, warmer water temperatures and lower dissolved oxygen levels. During the warm summer months, reservoir sediments and impounded water were likely depleted of dissolved oxygen and contributed to the presence of hydrogen sulfide. If present in sufficient concentration, hydrogen sulfide is toxic to fish. Furthermore, the previous discharges were largely made up of fine sediment (Emig 1992); whereas, the impounded sediments that will transport downstream follow construction has a small proportion of fine sediment (<10 percent) (Stillwater Sciences 2018a), and it will be released when the watershed is delivering its associated sediment load which is composed of 90% coarse sediment. Following construction of the proposed Project, the reservoir will not exist, eliminating the contributing factor for anoxia and toxic water. Post-construction discharges of impounded sediment will occur during high-flow winter events and saturated dissolved oxygen in streamflow are expected and, under these conditions, no fish kills are anticipated.

2.5.6. Access to Historic Rearing and Spawning Habitat

Creating a large notch in York Dam and allowing impounded sediment to pass downstream will improve upstream passage conditions for both juvenile and adult steelhead through the former dam site. With fish passage restored, steelhead will have access to high quality spawning and rearing habitat that has been blocked since at least 1900 (Napa County RCD 2005). For context, below York Creek Dam there currently exists about 9,700 linear feet of suitable steelhead rearing and spawning habitat in York Creek.[4] When the Project is completed, steelhead will have access to an additional 8,600 linear feet of suitable spawning and rearing habitat. Access to this additional rearing and spawning habitat will benefit the steelhead population of the York Creek watershed by significantly increasing the carrying capacity. The added spatial distribution in combination with higher abundance contributes to population resilience and the ability of the York Creek population to fulfill their functional roles within the DPS. These benefits to steelhead in the York Creek will support CCC steelhead recovery and conservation in the Napa River watershed.

2.5.7 Effects on Critical Habitat

The critical habitat designation for CCC steelhead in York Creek extends from the confluence with the Napa River upstream to York Creek Dam, since the dam is currently the upstream limit of anadromy for CCC steelhead. However, the effects of this Project are not limited to downstream from the dam; effects are also anticipated within the reservoir basin immediately upstream from the dam. This section of the opinion will focus on effects to habitat of York Creek downstream from the dam, as that is the only portion of York Creek designated as critical habitat for CCC steelhead.

Construction Impacts. As discussed above in sections 2.5.2, 2.5.3, and 2.5.4 of this opinion, Project construction activities are expected to result in short-term disturbances to the channel and adjacent streambank areas. Localized impacts to water quality in the form of increased levels of turbidity, reduction in benthic invertebrate abundance, and reduction in riparian vegetation are anticipated with construction of the notch in the dam. Degradation of water quality in the form of increased levels of turbidity and suspended fine sediment will generally be contained during construction by the use of cofferdams. The stream channel at the notch in the dam, in combination with the reservoir basin immediately upstream, will be adjusting to the new channel gradient and form a newly sculpted channel. Impacts to benthic habitat and associated invertebrates may occur as the channel adjusts, but the majority of these effects will occur within the area of channel excavation upstream from the dam and outside of critical habitat.

Regarding impacts to riparian vegetation, several coastal redwoods will be removed from the dam face to construct the notch; however, these trees will be re-used downstream for the large wood structures. Additionally, the Project proposes to replace all removed redwood trees at a 2:1 ratio in the same general locations. Small areas of riparian vegetation will be disturbed and some vegetation removed for equipment to access the 36 large wood structure construction sites.

[4] Personal communication from Jonathan Koehler, Napa County RCD, June 16, 2020.

Equipment to deliver and install logs will utilize six access points which will limit the amount of riparian vegetation impacts. Areas of disturbed or removed vegetation on access routes will be re-seeded to promote natural recruitment of native vegetation and recovery of these sites is expected to be short-term. Removal of riparian vegetation has the potential to affect increase stream with increased exposure to solar radiation and reduced forage as a consequence of trees and shrubs. Therefore, NMFS expects temporary short-term impacts to PBFs of critical habitat associated with vegetation removal at the dam notch construction area and access routes for the large wood structure construction sites. However, the existing mature riparian corridor downstream from the dam will remain in place and fully functioning, because the area effected by the Project's vegetation removal and disturbance is relatively small. Due to the small area subject to short-term riparian disturbance, Project construction activities are not expected to have an appreciable effect on stream shading, cover, water temperature or nutrient input in the action area.

<u>Restoration of Sediment Transport</u>. The primary impacts to critical habitat associated with this Project will occur post-construction and are associated with the restoration of sediment transport in York Creek. Approximately 4,000 CY of sediment currently impounded behind York Creek Dam will remain after the Project's excavation activities and are expected to be mobilized by streamflow during the first year following construction. In all model simulations produced by Stillwater Sciences (2018a, 2020) temporary increases in suspended sediment concentration are expected when impounded sediment is mobilized and transported downstream. As this sediment transports downstream, it may temporarily fill-in pools and cover riffle habitat used by rearing and spawning steelhead. These effects are discussed in detail in sections 2.5.4 and 2.5.5 of this opinion.

The long-term effects associated with the Project's activities in York Creek are expected to be substantively beneficial for steelhead and designated critical habitat in York Creek. Much of the impounded sediment deposit now behind the dam consists of high quality spawning gravel and other coarse sediment (WRA 2020a). Currently, gravels are deficient in York Creek downstream from the dam. This size sediment is important in rearing and spawning habitat for steelhead. When the impounded sediments, including gravels, begin to transport downstream, they will supplement the existing sediment in York Creek. The large wood structures placed within the 3,000-foot long portion of York Creek immediately downstream from the dam will slow sediment transport locally, and sort and retain sediments. Mobilized sediments may fill in some existing pools in York Creek; however, if the features leading to the creation and persistence of the pre-existing pools remain following construction, then those pre-existing pools should reform under proper conditions. Further, the large wood structures built by the Project will create new pools for fish habitat and new gravel depositional areas for spawning. With sediment deposition and channel aggradation following construction, the range of conditions at which York Creek streamflow inundates the floodplain will be increased and some sediment may deposit there. Floodplains can provide velocity refuge during high streamflow events and additional feeding opportunities for steelhead, which can improve overwinter survival of steelhead (Roni et al. 2014). By these means, coarse sediments mobilized and transported downstream are expected to provide long-term improvements in aquatic habitat conditions for steelhead and macroinvertebrates in York Creek below the former dam.

The creation of a notch in the dam will restore coarse sediment transport from the upper watershed to stream reaches below the dam and renewal of this physical process will support the restoration of ecological processes and ecosystem functions. As impounded sediment is transported downstream during the first year following Project construction by high streamflow events, the released sediment will increase the abundance of high quality spawning gravel in lower York Creek – a stream attribute that is currently diminished. Modeling results indicate the amount of fine sediment (silts and clays) will not increase significantly downstream following notching of the dam, as that size class of sediment passes York Creek Dam under current conditions (Stillwater Sciences 2018a).

Deposition of additional gravel and cobble materials in the channel below the dam is anticipated to expand spawning areas for steelhead and improve egg to emergence survival rates in redds. An increase in coarse sediment will also benefit productivity of macro-invertebrates that function as prey for steelhead. Aquatic insects demonstrate habitat preferences that are strongly tied to substrate composition. Mayflies (ephemeroptera), caddisflies (trichoptera), and stoneflies (plecoptera) prefer a mixture of coarse sands and gravels (Bjornn and Reiser 1991), and these are preferred prey species of juvenile steelhead (reviewed in Barnhart 1986). Creation of the notch at the dam will also ensure sediment transport continues through the former dam site into the future and provides for the restoration of natural fluvial-geomorphic processes in York Creek. By restoring the movement of sediment from the upper watershed to lower York Creek, habitat below the dam will be enhanced for steelhead spawning, increased cover, increased habitat complexity, and increased organic matter.

<u>Upstream Fish Passage.</u> Upon completion of the Project, the notch in the dam in combination with excavation of sediments from the former reservoir basin is anticipated to allow adult steelhead to ascend to historical habitat in the upper York Creek watershed. However, there are several factors to consider that potentially constrain fish passage through the completed notch. There is some uncertainty of the underlying geology at the location of the notch, as there are no as-built plans for the dam and no description of the antecedent channel conditions (WRA 2020a). There may be bedrock features present that may impede upstream migration past that location under some conditions. Also, the presence of the dam since 1900 has led to a degradation of the bed elevation downstream from the dam and an aggradation of the bed elevation upstream from the dam. As a result, the channel between those two elevations will be steeper than normal when the notch is constructed.

Two design elements of the Project are expected to work in concert to affect changes in the channel dynamics in the action area and allow for upstream fish passage by adult steelhead in the future. The first is to allow the remaining impounded sediment to transport downstream when local conditions allow, and a second is the placement of large wood structures downstream to encourage aggradation of downstream reaches of York Creek. These factors will lead to a dynamic environment in this local area until the bed reaches equilibrium. Once the stream reaches equilibrium, fish passage at York Creek Dam should be obtained. The City's proposed monitoring plan will test this assumption (Napa County RCD and WRA 2020). If the City identifies a persistent, significant impediment to upstream migration of steelhead, the City will develop and implement a plan to address the passage impediment so that steelhead can successfully recolonize upstream portions of York Creek.

Marine-Derived Nutrients. With access to additional high quality spawning and rearing habitat in the upper watershed, the steelhead population of York Creek is expected to increase. With a larger number to adult returns to the watershed, an increase in marine-derived nutrients should also benefit critical habitat. Marine-derived nutrients are nutrients that are accumulated in the biomass of salmonids while they are feeding in the ocean. Salmon and steelhead can spend the majority of their life cycle marine environments, and, thus most of their size and high rate of growth can be attributed to abundant food sources they encounter in the ocean. When these fish return to freshwater as spawning adults, they contribute the marine-derived nutrients they have obtained through egg and carcass deposition. Iteroparous species such as anadromous trout can contribute marine-derived nutrients during multiple spawning events throughout their lifespan. The return of salmonids to rivers makes a significant contribution to the flora and fauna of both terrestrial and riverine ecosystems (Gresh *et al.* 2000), and has been shown to be vital for the growth of juvenile salmonids (Bilby *et al.* 1996, 1998). Evidence of the role of marine-derived nutrients and energy in ecosystems suggests this deficit may result in an ecosystem failure contributing to the downward spiral of salmonid abundance (Bilby *et al*. 1996). Reduction of marine-derived nutrients to watersheds is a consequence of the past century of decline in salmon abundance (Gresh *et al*. 2000).

Cederholm *et al*. (1999) suggested that aquatic macroinvertebrates likely benefit from marine derived nutrients through an increase in primary productivity, thereby creating a positive feedback loop for juvenile salmonids by increasing their food supply. In California, native riparian vegetation and cultivated wine grapes obtained significant amounts of marine-derived nutrients from salmonids (Merz and Moyle 2006). Marine-derived nutrients can be restored to the food web following dam removal as observed in a single year following dam removal on the Elwah River in Washington State (Tonra *et al*. 2015). In York Creek, an increase in adult steelhead returns to the watershed and the associated increase in contribution of marine-derived nutrients are expected to provide multiple benefits to PBFs of CCC steelhead critical habitat.

Large Wood Structures. Natural fluvial and geomorphic processes in the action area have been compromised by the presence and operation of York Creek Dam. Streams transport water and sediment from upland sources to the ocean and, generally speaking, the faster the streamflow, the greater the erosive force. A few natural mechanisms constrain and moderate these erosive forces, such as the slowing of streamflow (and by extension its erosive force) resulting from complex structure both within (*e.g*., boulders or woody debris) and adjacent (*e.g*., riparian vegetation) to the stream channel (Knighton 1998). Disruption of sediment transport by the presence of York Dam has reduced the amount of beneficial gravel and cobble below the dam, and contributed to channel incision. The Project's proposed installation of up to 36 large wood structures is designed to collect coarse sediments and reverse channel incision in the reach extending 3,000 linear feet downstream from the dam.

Large wood structures influence the channel form, retention of organic matter, and biological community composition. The benefits of large wood include increased cover for rest and to escape from predators, increased hydraulic diversity affording refuge from high velocity and high turbidity, increased rearing and spawning habitat, improved upstream and downstream migration corridors, improved pool to riffle ratios, and added habitat complexity and diversity.

Presence and abundance of large wood structures are correlated with growth, abundance and survival of juvenile salmonids (Fausch and Northcote 1992, Beechie and Sibley 1997). In small (<10 m bankfull width) and intermediate (10 to 20 m bankfull width) streams, large wood structures contribute channel stabilization, energy dissipation and sediment storage (Cederholm *et al.* 1997). By intercepting and slowing the transport of coarse sediment after placement of the large wood structures, the bed sediment will sort and deposit, and the bed elevation will rise in the area of these structures.

The size of large wood structures is important for habitat creation (Fausch and Northcote 1992). Large pieces of wood are typically more capable at storing sediment, halting debris flows, and decreasing downstream flood peaks (Reid 1998). Large wood structures alter the longitudinal profile of the stream and reduce the local gradient of the channel, especially when log dams create slack pools above or plunge pools below them, or when they are sites of sediment accumulation (Swanston 1991).

The large wood structures proposed by this Project have been designed to work in combination with the transport of the impounded sediments from the former reservoir basin (WRA 2020a) and provide multiple habitat benefits for all age classes of steelhead. The structures will create cover for adult and juvenile steelhead, increase spawning habitat by collecting coarse sediment, improve upstream and downstream migration corridors, improve pool to riffle ratios, and add habitat complexity and diversity. Preferred territories of juvenile steelhead are commonly associated with instream large woody debris due to enhanced cover, improved water depths, and greater food availability. The wood structures can also beneficially alter the physical characteristics of the treated site by changing the distribution and magnitude of water depths and velocities which adds to habitat complexity. Habitats units formed by scour (*e.g*., pools) associated with boulders, large pieces of wood, and intact rootwads are the preferred habitats of steelhead (Spina 2003, Gallagher *et al.* 2014).

Portions of each of the large wood structures will be constructed up the bank and onto the floodplain (WRA 2020b, 2020c). During winter high flow events, the wood structures are expected to increase water surface elevations allowing York Creek to inundate the narrow floodplain and its off-channel habitat, thereby benefitting juvenile steelhead by providing low velocity, off-channel habitats such as backwater pools, side channels, and woody riparian vegetation that serve as velocity and turbidity refugia (Shapovalov and Taft 1954, Solazzi *et al.* 2000) and food-rich rearing habitat (Hartman *et al*. 1987, Bellmore *et al*. 2013, Martens and Connolly 2014, Sellheim *et al.* 2016).

This Project's installation of large wood structures could also provide benefits to York Creek on a larger scale. Large wood can influence stream channel form, and retention of sediments and organic matter. As reported by Cederholm *et al*. (1997), the placement of appropriately sized large wood structures contributes to channel stabilization, energy dissipation, and sediment storage. Habitat enhancements associated with placement of large wood have been shown to increase distribution, abundance, growth, and survival of juvenile steelhead (Fausch and Northcote 1992, Beechie and Sibley 1997). These changes in stream conditions and processes associated with Project's large wood structures are expected to provide immediate and long-term benefits to PBFs of CCC steelhead critical habitat throughout York Creek.

2.6. Cumulative Effects

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

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

2.7. Integration and Synthesis

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

CCC steelhead are listed as threatened. Based on the extensive loss of historic habitat due to dams and the degraded condition of remaining spawning and rearing areas, CCC steelhead populations in watersheds that drain to San Francisco Bay, including the Napa River and its tributaries, have experienced severe declines. Steelhead are present in York Creek, though in densities and abundance lower than historic conditions. The presence and past operation of York Creek Dam since 1900 has adversely affected CCC steelhead and aquatic habitat in York Creek by preventing access to historic spawning and rearing habitat, reducing streamflow when the City was diverting from York Creek, reducing available habitat for juvenile rearing, and blocking transport of sediment. Suburban and agricultural development downstream from York Dam has encroached on lower York Creek, resulting in reduced riparian vegetation, reduced channel complexity, increased channelization, and concentrated stormwater discharge to the stream. These factors lead to a flashier stream hydrograph, increased toxic inputs, and reduced quality aquatic habitat. Aquatic habitat currently accessible to CCC steelhead within York Creek is degraded.

As described in the *Effects of the Action* (Section 2.5), during Project construction NMFS anticipates adverse effects to steelhead and designated critical associated with dewatering of 1,000-linear feet of York Creek, relocation of steelhead, excavation of impounded sediment from the reservoir, construction of the notch in York Dam, tree removal from the construction area, and placement of 36 large wood structures in York Creek. NMFS estimates up to 122 juvenile steelhead may be collected within the dewatered portion of York Creek and as many as 6 of these individuals may be injured or killed during relocation. NMFS does not anticipate that adult steelhead will be in York Creek during construction.

The in-water installation of the 36 large wood structures may result in additional injuries or mortalities of juvenile steelhead if individuals are crushed by log placements; however, the risk of injury and mortality associated with this construction element is low because juvenile steelhead are strong swimmers and most individual fish are expected to successfully vacate the work sites during construction. Dewatering of the channel will temporarily reduce benthic invertebrate abundance, although rapid recolonization is expected following re-watering of the channel. The Project will remove some redwood trees at the dam, and further impact riparian vegetation by trimming some plants along the access roads to the large wood structure construction sites. With re-planting of trees and re-seeding to promote natural recruitment of native vegetation, NMFS anticipates no adverse effects to riparian habitat functions along York Creek.

Post-construction, adverse effects associated with the mobilization of impounded sediments in the former reservoir basin are expected to occur. Approximately 4,000 CY of primarily coarse sediment (<10 percent of the sediment is sand and silt) will remain in York Creek to be transported downstream by high flow events. Modeling performed by Stillwater Sciences (2018a, 2020) indicated impounded sediments would erode quickly following construction. The majority of impounded sediments will be mobilized during first high streamflow events of the wet season and will transport downstream quickly. High streamflows will refine the constructed pilot channel and sculpt a natural creek bed and floodplain. A state of equilibrium in the channel through the former reservoir basin and the dam's notch is expected to occur within the first year following Project completion.

Impounded sediment transporting down York Creek will result in temporary effects to water quality. High concentrations of suspended sediment and turbidity are expected to disrupt feeding, hiding, respiratory function, and result in mortality of steelhead if the magnitude or duration of the exposure is sufficient. All of the 1+ and 2+ age steelhead in York Creek during the first winter following construction will be exposed to several days of high suspended sediment concentration occurring with the first pulses of transporting sediments. Modeling by Stillwater Sciences (2018a, 2020) predicts elevated suspended sediment concentrations will extend from 3 to 7 days during the initial event that mobilizes impounded sediment. Based on the work of Newcombe and Jensen (1996), up to 40 percent of the juvenile steelhead in York Creek could be subject to mortality during the initial pulse of mobilized sediment and the balance of the juvenile population will be subjected to stress and sub-lethal effects for several days. This loss of steelhead would be a one-time event and would compromise the strength of the two year classes of steelhead in York Creek in a manner similar to that of previous sediment-related fish kills that occurred in York Creek.

The majority of adult steelhead are unlikely to be exposed to suspended sediment concentrations approaching the maximum peak level, because it is expected that the impounded sediments will be mobilized prior to adults returning to York Creek. If a few early migrating fish successfully pass upstream through the seasonally dry lower reach of creek, these adults would also be subject to the stress and mortality described above for juvenile steelhead. Eggs and alevins in any constructed redds could be lost if sediment accumulation within interstitial spaces constricts the flow of water which delivers dissolved oxygen and removes metabolic wastes. However, this sequence of events has a low probability of occurrence because the majority of impounded sediments will be mobilized during the first substantial precipitation events of the season and these rainfall events typically occur prior to the immigration of CCC steelhead in the Napa River watershed. Furthermore, adult steelhead will not have access to pass upstream into York Creek from the Napa River until there is sufficient streamflow for passage through lowermost portion of the creek. Although unlikely, if these conditions did occur, NMFS estimates a small number of early returning adult steelhead (up to three adults) and eggs within their redds could be subject to injury and mortality. Once the pulse of impounded sediments released from behind the dam has moved through York Creek, no lasting harmful effects to the stream are expected.

The potential loss of up to 40 percent of juvenile steelhead residing in York Creek and up to three adult steelhead/redds would likely reduce current population size and have effects on fish abundance in York Creek over the next 1 to 4 years. Although the population will be temporarily reduced, CCC steelhead adults will be returning to enhanced conditions in York Creek. Project restoration actions are expected to create high quality and expanded areas of spawning gravel which will result in higher egg to emergence survival rates. Juvenile rearing habitat will also be enhanced by the large wood structures with improved cover, increased habitat complexity, and higher macroinvertebrate production. Furthermore, adults will be able to pass the former dam site to spawn in high quality habitat in the upper watershed. All these actions are expected to increase reproductive success and result in higher juvenile steelhead survival rates, which will allow the York Creek steelhead population to re-build from Project-associated impacts and expand to population levels higher than existing in a relatively short period of time.

Project benefits to steelhead include restoration of passage for steelhead to access the upper York Creek watershed into historic spawning and rearing habitat, re-establishment of coarse sediment transport from the upper watershed to lower York Creek, and treatment of the 3,000-foot reach downstream from the dam with 36 large wood structures. These benefits to steelhead in the York Creek will support CCC steelhead recovery and conservation in the Napa River watershed. Notching York Creek Dam will allow steelhead access to 1.5 miles of spawning and rearing habitat that has been unavailable since 1900. Access to this additional rearing and spawning habitat will benefit the steelhead population of the York Creek watershed by significantly increasing the carrying capacity. The added spatial distribution in combination with higher abundance contributes to population resilience and the ability of the York Creek steelhead population to adapt to climate change as well as fulfill their functional roles with the DPS.

The restoration of coarse sediment transport in York Creek will reverse more than a century of impact to the creek environment and will restore fluvial-geomorphic processes. Habitat below the dam will be enhanced for steelhead by additional coarse sediment for spawning, increased cover for juvenile rearing, increased channel complexity and floodplain habitat, increased velocity refugia, and increased organic matter. The restoration of this physical process on York

Creek will support the restoration of ecological and geomorphic processes in the former reservoir area and downstream from the former dam site. The installation of 36 large wood structures in York Creek in the 3,000 feet immediately downstream from the dam will also enhance habitat conditions for steelhead in combination with the return of sediment transport in the creek. These wood structures are anticipated to slow sediment transports through this portion of York Creek, increase pool number and depth, increase cover for all life stages of steelhead, sort and retain coarse sediment and increase spawning opportunities for steelhead, and elevate local water surface elevations increasing the range of conditions at which York Creek engages its floodplain. All of these anticipated improvements will address high-priority, recovery actions for CCC steelhead in the Coastal Multispecies Recovery Plan (NMFS 2016a).

Due to the limited duration of adverse effects to steelhead from construction activities, the anticipated environmental benefits expected following construction, and the relatively large number of juveniles produced by each spawning pair, the steelhead population in York Creek is anticipated to be able to replace any steelhead lost during Project construction and during the subsequent mobilization of impounded sediments downstream. Completion of the project is expected to significantly benefit designated critical habitat in the action area by increasing the amount and quality of spawning habitat, returning sediment transport rates to natural levels, increasing aquatic habitat quality and heterogeneity, and increasing access to floodplain habitat.

Regarding future climate change effects in the action area, California could be subject to higher average summer air temperatures and lower total precipitation levels. Reductions in the amount of precipitation would reduce streamflow levels in Northern and Central Coastal rivers. Estuaries may also experience changes in productivity due to changes in freshwater flows, nutrient cycling, and sediment amounts. For this project, all adverse effects associated with the Project will occur during construction and the initial winter/spring following construction; although the adverse effects of mobilized impounded sediments would be delayed in a dry year until rainfall returns to the watershed. These impacts would be completed in one year and the above effects of climate change are unlikely to be detected within this time frame. If the effects of climate change are detected over the short term, they will likely materialize as moderate changes to the current climate conditions within the action area. These changes may place further stress on CCC steelhead populations. The effects of the proposed Project combined with moderate climate change effects may result in conditions similar to those produced by natural ocean-atmospheric variations as described in the Environmental Baseline section of this opinion (Section 2.4) and annual variations. CCC steelhead are expected to persist throughout these phenomena, as they have in the past, even when concurrently exposed to the effects of similar projects.

2.8. Conclusion

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

2.9. Incidental Take Statement

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

2.9.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

NMFS anticipates that take of threatened CCC steelhead associated with the York Creek Dam Removal Project, City of St. Helena, Napa County, California will be associated with Project construction activities and the mobilization of impounded sediments from the former reservoir basin immediately following construction.

During construction, incidental take of juvenile CCC steelhead is expected to result from dewatering up to 150 linear feet of the York Creek channel below the dam. Fish collection and relocation prior to dewatering may capture up to 122 juvenile steelhead and up to 4 individuals may be injured or killed during these activities. NMFS anticipates that no more than 2 additional juvenile steelhead will avoid capture during relocation efforts and die during dewatering of the work site. The anticipated level of take will be exceeded if more than 122 juvenile steelhead are collected and more than 6 juvenile steelhead are injured or killed during capture/relocation and dewatering activities.

During installation of the 36 large wood structures, in-water placement of the logs may result in the injury or mortality of juvenile steelhead through crushing by equipment, logs, or workers. The anticipated level of take will be exceeded if construction of the wood structures extends outside the period of July 1 to October 31.

Post-construction, the mobilization of impounded sediments from the former reservoir basin during high flow events following construction will create levels of turbidity and suspended sediment that are reasonably expected to result in the injury and mortality of juvenile CCC steelhead. Up to 40 percent of the age 1+ and 2+ steelhead may be injured or killed during the initial pulse event that mobilizes impounded sediments downstream from the former reservoir basin. Up to three adult steelhead and their associated redds may also be injured or killed during the initial sediment transport pulse event by high levels of suspended sediment and sediment accumulation at redds.

It is not practical to accurately quantify and monitor the amount or number of juvenile steelhead that are expected to be taken by elevated levels of turbidity and suspended sediment. This is due to the variability in the population size at any given time of exposure to the stressor of turbidity over the threshold of potential injury of the species. Therefore, the ecological surrogate for the amount or extent of take of CCC juvenile steelhead is turbidity levels measured during high streamflow events during the first year after completion of construction. The anticipated level of take will be exceeded if the level of turbidity measured in Monitoring Reach 3 at Private Driveway Bridge #3 is greater than 1.5 times the level of turbidity measured upstream of the former York Creek Dam site on the 7^{th} day (i.e., 168 hours) following the initiation of each significant rainfall event ($\geq$ 0.5 inch/day) during the first winter/spring following construction.

For monitoring and quantifying the extent of take of adult steelhead and redds, spawning surveys performed as part of the Monitoring and Adaptive Management Plan will directly observe the number, timing and location of adult steelhead spawners. This monitoring is expected to provide an accurate measure of the number of adults and redds subjected to the effects of high suspended sediment concentrations and mobilized sediments during the first winter/spring following construction.

2.9.1. 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.

2.9.2. Reasonable and Prudent Measures

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

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

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

2. Monitor turbidity levels in York Creek during and following storm events to observe changes in suspended sediment transport dynamics within the stream and exposure on CCC steelhead.

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

2.9.3. 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:

   i. Capture and Relocation Activities – Captured fish shall be handled with extreme care and kept in water to the maximum extent possible during relocation activities. All captured fish shall be kept in cool, shaded, aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream, and fish shall not be removed from this water except when released. To avoid predation, the biologist shall have at least two containers and segregate young-of-year fish from larger age classes and other potential aquatic predators. Captured salmonids will be relocated, as soon as possible, to a suitable instream location in which habitat condition are present to allow for adequate survival of transported fish and fish already present.

   ii. Steelhead Injuries and Mortalities – If any salmonids are found dead or injured, the biologist shall contact NMFS biologist Daniel Logan by phone immediately at (707) 575-6053 or the NMFS North-Central Coast Office at (707) 575-6050. The purpose of the contact is to review the activities resulting in take and to determine if additional protective measures are required. All salmonid mortalities shall be retained, placed in an appropriately-sized sealable plastic bag, labeled with the date and location of collection, fork length measured, and frozen as soon as possible. Frozen samples shall be retained by the biologist until specific instructions are provided by NMFS. The biologist may not transfer biological samples to anyone other than the NMFS North-Central Coast Office without obtaining prior written approval from the Supervisor of our North-Central Coast Office. Any such transfer will be subject to such conditions as NMFS deems appropriate.

   iii. Instream Construction Materials – All cofferdams, pumps, pipes and other diversion materials, and any construction debris and materials will be removed from the stream upon work completion and no later than October 31.

   iv. Diversion Screening – All pumps used to divert live streamflow will be screened and maintained throughout the construction period to comply with NMFS' Fish Screening Criteria for Anadromous Salmonids. See: https://archive.fisheries.noaa.gov/wcr/publications/hydropower/southwest_region_1997_fish_screen_design_criteria.pdf

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

The City shall monitor the turbidity of York Creek using the turbidity monitoring techniques and sampling sites described in the Monitoring and Adaptive Management Plan (Napa County RCD and WRA 2020), with the following modifications to the frequency of turbidity monitoring and reporting of results:

(a) The City shall monitor the turbidity of York Creek in Monitoring Reach 3 at Private Driveway Bridge #3 and upstream of the former York Creek Dam site during the first winter/spring following construction at the intervals presented below. The timing of measurements shall begin at the initiation of each significant rainfall event (defined as $\geq$ 0.5 inches of rain with 24 hours):

- 24 hours (day 1) following initiation of the rainfall event;
- 72 hours (day 3) following initiation of the rainfall event;
- 120 hours (day 5) following initiation of the rainfall event;
- 168 hours (day 7) following initiation of the rainfall event.

If the level of turbidity at Private Driveway Bridge #3 is less than 1.5 times the level of turbidity at the upstream monitoring location prior to day 7 and rainfall has ceased, monitoring may be terminated until the next significant rainfall event.

(b) The City shall monitor the turbidity of York Creek during each significant rainfall event during the first 12 months following construction. The City may request to NMFS to discontinue turbidity monitoring during rainfall events if the maximum turbidity between Private Driveway Bridge #3 does not exceed 1.5 times the level of turbidity at the upstream monitoring location. However, the City shall monitor the turbidity of York creek for no fewer than three precipitation events.

(c) The City shall provide a written report with the results of turbidity monitoring for each precipitation event to NMFS within one week of completion of each 7-day monitoring episode. The report must include a description of the locations from which turbidity was measured, the dates and times of the monitoring, photographs of the stream at the sampling locations, a brief description of the equipment and methods used to collect and evaluate turbidity, levels of turbidity measured, a description of any problems which may have arisen during the monitoring of turbidity, and a description of any and all non-project-related sediment contributions to York Creek observed, such as turbid water from roadways.

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

The Corps or applicant must provide a written report related to construction activities and fish relocation to NMFS by January 15 of the year following construction of the proposed action. The Corps or applicant must provide to NMFS a report of the post-construction site performance, which will include monitoring results and adaptive maintenance activities undertaken, with the exception of the turbidity monitoring as described in term and condition #2. The post-construction site performance monitoring report shall be produced annually throughout the monitoring period of ten (10) years following completion of construction of the Project. The due date of the post-construction site performance monitoring report shall be agreed upon, in writing, by the Corps, the City, and NMFS. The construction activities and fish relocation report and the post-construction site performance monitoring reports must be provided to NMFS North-Central Coast Office, Attention: San Francisco Bay Branch Chief, 777 Sonoma Avenue, Room 325, Santa Rosa, California, 95404-6528. The report must contain, at a minimum, the following information:

i. Construction Related Activities – The report must include the dates construction began and was completed, a discussion of any unanticipated effects or unanticipated levels of effects on salmonids, a description of any and all measures taken to minimize those unanticipated effects and a statement as to whether or not the unanticipated effects had any effect on ESA-listed fish, the number of salmonids killed or injured during the project action, and photographs taken before, during, and after the activity from photo reference points.

ii. Fish Relocation – The report must include a description of the location from which fish were removed and the release site including photographs, the date and time of the relocation effort, a description of the equipment and methods used to collect, hold, and transport salmonids, the number of fish relocated by species, the number of fish injured or killed by species and a brief narrative of the circumstances surrounding ESA-listed fish injuries or mortalities, and a description of any problems which may have arisen during the relocation activities and a statement as to whether or not the activities had any unforeseen effects.

iii. Post-Construction Site Performance – The report must include a summary of annual monitoring activities, including dates and a description of the locations for each specific monitoring activity with site photographs; a discussion of monitoring results; a review of previous monitoring findings, trends and changes observed; a discussion of assessments conducted, conclusions; a description of and rationale for any adaptive management activities recommended or implemented; and a description of any problems which may have arisen during the monitoring of post-construction site performance.

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).

1. To maximize the efficacy of the restoration efforts and to aid in recovery of steelhead, the Corps should work collaboratively with the City of St. Helena, County of Napa, the Napa Resource Conservation District, and NMFS to replace or retrofit crossings to achieve more natural channel conditions. Implementation of this Conservation Recommendation at the following three sites will address recovery actions for CCC steelhead related to

sediment transport and fish passage (NpR-CCCS-23.1.2.1, NpR-CCCS-23.1.2.2, NpR-CCCS-23.1.2.3) in the Napa River watershed:

a. Boysen Lane crossing of York Creek located approximately here: 38.505958, -122.485206;
b. Spring Mountain Road crossing of York Creek located approximately here: 38.506486, -122.481762; and
c. Sulfur Creek fish passage project located approximately here: 38.4879, -122.4816.

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, NMFS requests notification of the implementation of any conservation recommendations. This notification shall be submitted to NMFS Santa Rosa Area Office, Attention: Supervisor of San Francisco Bay Branch, 777 Sonoma Avenue, Room 325, Santa Rosa, California, 95404-6528.

2.11. Reinitiation of Consultation

This concludes formal consultation for Upper York Creek Ecosystem Restoration and Aquatic Habitat Enhancement Project in Napa County, California.

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.

3. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

3.1. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the Corps. Other interested users could include the City of St. Helena, the County of Napa, the California Department of Fish and Wildlife, the Regional Water Quality Control Board, the U.S. Environmental Protection Agency, the San Francisco Estuary Partnership, citizens within the affected areas, and others interested in the conservation of aquatic and riparian resources.

Individual copies of this opinion were provided to the Corps, the U.S. Environmental Protection Agency, the City of St. Helena and its consultants, the California Department of Fish and Wildlife, the Regional Water Quality Control Board, and the San Francisco Estuary Partnership. The document will be available within two weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adheres to conventional standards for style.

3.2. Integrity

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

3.3. Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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1.1 Personal Communication

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