Humboldt Bay Trail South

Biological Assessment/Essential Fish Habitat Assessment

Humboldt County, California
Eureka, and Arcata South, California 7.5-Minute Quadrangles
Township 5 North, Range 1 West and 1 East,
Sections 23 and 24, and 4, 9, and 17.
Remaining portions unsectioned
RPSTPL-5904(143)

February 2018

Caltrans
CALIFORNIA DEPARTMENT OF TRANSPORTATION

Humboldt Bay Trail South
Biological Assessment/Essential Fish Habitat Assessment

Humboldt County, California

Eureka, and Arcata South, California 7.5-Minute Quadrangles

Township 5 North, Range 1 West and 1 East,

Sections 23 and 24, and 4, 9, and 17.

Remaining portions unsectioned RPSTPL-5904(143)

Prepared By: _____ Date: 2-23-18

David Pluth, Biologist
North State Resources, now Stantec Inc.
(530) 222-5347, extension #123

Local Agency Approved By: Hank Seemann Date: 2-23-2018

Hank Seemann, Deputy Director
Humboldt County Public Works Department
(707) 445-7741

Recommended Approved By: _____ Date: 2-23-18

Local Assistance, District 1, Caltrans

Caltrans SEP Approved By: _____ Date: 02/23/18

Brandon Larsen, Senior Environmental Planner
Local Assistance, District 1, Caltrans
(707) 445-6410

Executive Summary

The purpose of this Biological Assessment/Essential Fish Habitat Assessment (BA/EFHA) is to provide technical information and to review the proposed action in sufficient detail to determine to what extent the proposed action may affect threatened, endangered, or proposed species. The California Department of Transportation (Caltrans), as assigned by the Federal Highway Administration, has prepared this BA/EFHA under its assumption of responsibility provided in 23 United States Code 327(a)(2)(A). This BA/EFHA is also prepared in accordance with 50 CFR 402, legal requirements found in Section 7 (a)(2) of the Endangered Species Act (ESA) (16 U.S.C. 1536(c)) and with Federal Highway Administration and Caltrans regulation, policy and guidance. This BA/EFHA presents technical information upon which later decisions regarding project effects may be developed.

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a federal fisheries management plan. This act requires federal agencies to consult with National Marine Fisheries Service (NMFS) on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (MSA §305[b][2]). A component of this consultation process is the preparation and submittal of an EFH assessment.

This BA/EFHA has been prepared for submission to the U.S. Fish and Wildlife Service (USFWS) and the NMFS to address potential impacts to fish species listed pursuant to the ESA and potential impacts to EFH for several commercially important fisheries. In the action area, the federally listed fish species potentially present and that may be affected by the proposed action are the "threatened" Southern Oregon/Northern California Coasts (SONCC) Evolutionarily Significant Unit (ESU) coho salmon (*Oncorhynchus kisutch*), "threatened" California Coastal (CC) ESU Chinook salmon (*O. tshawytscha*), "threatened" Northern California (NC) Distinct Population Segment (DPS) steelhead (*O. mykiss irideus*), "threatened" Southern DPS green sturgeon (*Acipenser medirostris*), "threatened" southern DPS eulachon (*Thaleichthys pacificus*) and the "endangered" tidewater goby (*Eucyclogobius newberryi*).

The proposed action described herein has been developed to avoid and minimize adverse effects to federally listed fish species and their habitat and other sensitive natural resources to the maximum extent practicable. Additionally, specific conservation measures have been developed to be implemented as part of the proposed action to further avoid and minimize

the potential for take of federally listed fish species and adverse effects on designated critical habitat and EFH for commercially important fisheries. In designing the project, the County considered the boundaries of waters of the United States; the existing topographic, hydrologic, and ecologic conditions in the action area; project cost; local planning policies; local, state, and federal environmental regulatory requirements; and previous ESA Section 7 consultations for projects in the vicinity of the proposed action.

Based on the analysis in this BA/EFHA, it is determined that the proposed Humboldt Bay Trail South Project "may affect, but is not likely to adversely affect" the "threatened" SONCC ESU coho salmon, "threatened" California Coastal ESU Chinook salmon, "threatened" Northern California DPS steelhead, "threatened" southern DPS green sturgeon, and "threatened" southern DPS eulachon. Additionally, the "endangered" tidewater goby and its designated critical habitat is known to occur regionally in the vicinity of the proposed action. However, because the proposed action consists of activities that would conform to a 2011 informal ESA section 7 consultation for the tidewater goby, programmatically covering routine maintenance, repair and small project activities for Caltrans' transportation system responsibilities in Humboldt County (USFWS 2011), Caltrans will seek to include the proposed action for coverage under that consultation and, therefore, tidewater goby is excluded from detailed treatment in this BA. These determinations are based on evaluation of the best available scientific information on the potential for occurrence of listed species and their designated critical habitats within the action area and on the likely effects of project activities on potentially occurring listed species.

The potential effects on federally-listed fish species from the proposed action are summarized, as follows.

The trail and bridge construction techniques, stormwater and erosion best management practices, seasonal work windows, and scheduling of in-channel work during daily ebb tides will reduce the probability and risk of direct and indirect effects on the listed fish species to discountable levels. Localized, short-term, transient disturbance of sediments by minimal excavation along shorelines and in intertidal mudflats and pile-driving adjacent to and in dewatered areas of a tidal slough and the bay bottom during construction of the new trail and bridges over Brainard's Slough and the California Redwood Company (CRC) property may occur during construction. However, in-channel construction will be restricted to mid- to late-summer, when listed species' seasonal abundances are lowest, and during daily low tides, when fish would be least likely to be present in the action area, to minimize effects to the greatest extent possible on designated critical habitat. Vibratory hammers will be primarily used, along with incidental use of impact hammers for final proofing of steel shell

piles, for bridge foundations and piers. The focus on vibratory installation of piles will further minimize potential hydroacoustic effects on listed fishes. The area of potential hydroacoustic effect from the proposed pile driving activities, based on interpretations and calculations using sound levels documented from projects with comparable environmental conditions to the proposed action, would not likely rise to critical behavioral or physiological impact thresholds at any of the bridge sites. Temporary impacts to a small portion of tidal mudflat habitat would occur from a proposed coffer dam built to expedite construction of the north bridge crossing at the CRC property. This coffer dam would temporarily prevent access to an estimated 0.3 acre of tidal mudflat habitat; however, the local habitat here is not a preferred habitat for any federally listed fish species. The railroad bed and culverts at Brainard's Slough are deteriorated and have collapsed into the slough channel and may currently impede fish passage. Remediation of this condition through construction of the trail bridge would reduce the potential barriers and improve aquatic habitat connectivity to Rocky and Washington gulches for aquatic organisms that migrate between marine and freshwater environments, including the federally listed fishes.

The total area of shoreline and aquatic habitat that would be affected by the proposed project is small relative to the total habitat available in the vicinity of the action area. Permanent impacts would include an estimated 500 lineal feet of rip-rap approximately 15 feet wide added to an existing intertidal rocky shoreline area along the North Eucalyptus area (Segment 7), for a total footprint of 7,500 square feet. Of this total, 300 square feet (0.007 acre) will be placed in *Estuarine Intertidal Emergent Wetlands – Native*, and 300 square feet (0.007 acre) will be placed in *Estuarine Intertidal Unconsolidated Bottom* wetland, both of which will require mitigation. Additional permanent impacts would include an estimated 18 square foot loss of tidal flat habitat resulting from pile placement for the north CRC crossing. The key physical and biological features of critical habitat in the affected waterways will not be altered or destroyed by the proposed action to the extent that the aquatic productivity in the action area and the survival and recovery of the listed species would be measurably reduced and therefore is insignificant. In fact, removal of the deteriorated culvert and restoration of the channel bed at the Brainard's Slough crossing would benefit the listed fish species. Accordingly, it is determined that the proposed action "may affect, but is not likely to adversely modify" designated critical habitat for the SONCC ESU coho salmon, CC ESU Chinook salmon, NC DPS steelhead, and the southern DPS green sturgeon. It is determined that the proposed action may "adversely affect" (i.e., eliminate or significantly diminish or disrupt) EFH for Pacific salmon, groundfishes, and coastal pelagic fishes within the action area because construction of the bridge over Brainard's Slough and the bridges to the CRC property in the intertidal mudflats in Humboldt Bay may temporarily disrupt physical and biological features of EFH. The temporary disruption of EFH for these managed fisheries

would be minimized by synchronizing all in-channel and in-bay work activities with daily low tides to minimize potential increases in turbidity that may occur during construction activities. Additionally, isolation of the work area proposed on the intertidal mudflat by a water-filled bladder coffer dam would prevent direct contact of the construction site with bay waters and minimize the overall time to complete work on the bridge over the mudflat. Any substrate sediment disturbances created by these in-channel and in-bay construction activities would be temporary and localized such that the long-term value of the affected EFH will not be significantly diminished.

Humboldt Bay Trail South
Biological Assessment/Essential Fish Habitat Assessment

Contents

Tables

Figures

Appendices

List of Abbreviated Terms

ADA	Americans with Disabilities Act
BA/EFHA	Biological Assessment/ Essential Fish Habitat Assessment
BMP	Best Management Practices
Caltrans	California Department of Transportation
CC	California Coastal
CISS	cast-in-steel-shell
CPUE	catch-per-unit-effort
CRC	California Redwood Company
CWA	Clean Water Act
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESHA	Environmentally Sensitive Habitat Areas
ESU	Evolutionary Significant Unit
FWS	Fish and Wildlife Service
LWD	large woody debris
MPH	miles per hour
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
msl	mean sea level
NC	Northern California
NCRA	North Coast Railroad Authority
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PAH	polynuclear aromatic hydrocarbons
PBF	physical and biological features
PCE	primary constituent element
SONCC	Southern Oregon/Northern California Coasts
SWPP	Storm Water Pollution Prevention Plan
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
YOY	young-of-year

Chapter 1. Introduction

1.1. Purpose and Need of the Proposed Action

This Biological Assessment/Essential Fish Habitat Assessment (BA/EFHA) was prepared for Humboldt County (County) in accordance with legal requirements set forth under Section 7 of the Endangered Species Act (ESA) (16 United States Code [USC] 1536[c]) and the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267).

The purpose of this BA/EFHA is to evaluate the potential effects of the proposed Humboldt Bay Trail South project (proposed project/proposed action) on federally listed species. Federally listed species consist of all fishes determined by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) to be endangered, threatened, or proposed for endangered or threatened status under the auspices of the ESA. Essential fish habitat (EFH) for federally managed commercial fisheries is defined in respective federal fishery management plans for Pacific salmon, Pacific coast groundfish, and coastal pelagic fishes. Implementation of both the ESA for federally listed anadromous fish species and EFH provisions of Public Law 104-267 are administered by NMFS.

The proposed action would provide the interconnecting link between two other segments of the Humboldt Bay Trail currently in progress – the City of Arcata's Humboldt Bay Trail North project and the City of Eureka's Waterfront Trail project. The Humboldt Bay Trail South project (project) area extends from the southern terminus of the City of Arcata's trail project, located near Brainard's Slough (also known as Rocky Gulch) north of the Bracut Industrial Center (Bracut), to the existing Waterfront Trail in Eureka, for a total length of approximately 4.2 miles. The majority of the project is proposed to be situated between U.S. Highway 101 (Highway 101) and the NCRA railroad corridor, with a portion located on the perimeter levee along the California Redwood Company's (CRC) property and a portion occupying the NCRA railroad corridor in the vicinity of the Eureka Slough crossing.

The trail is needed because Highway 101 between Eureka and Arcata is an incomplete transportation facility that was designed primarily to support motorized vehicles. The proposed project would improve safety for non-motorized and motorized travelers between the communities of Eureka and Arcata, while relieving traffic congestion, enhancing coastal access and recreational opportunities, promoting community connectivity, reducing fuel consumption and emissions, and partially rehabilitating the existing railroad bed fill prism.

1.2. Threatened, Endangered, Proposed Threatened or Proposed Endangered Species, Critical Habitat

On February 13, 2018, a list of federal special-status species with the potential to occur in the proposed action area was electronically obtained from the USFWS (https://ecos.fws.gov/ipac/) (Appendix A). On February 13, 2018 a list of federal special-status species was obtained from the NMFS species list mapping tool (Appendix A). In addition, a site survey and literature reviews were used to evaluate and make determinations of whether suitable habitat for any of the federally listed species occurs in the action area (Table 1). For the purpose of this BA/EFHA—which has been prepared to facilitate consultation with the NMFS under Section 7 of the ESA, the following federally listed species are discussed in further detail in Chapter 4:

- Southern Oregon/Northern California Coasts (SONCC) Evolutionarily Significant Unit (ESU) coho salmon (*Oncorhynchus kisutch*)—Federally listed as Threatened
- California Coastal (CC) ESU Chinook salmon (*O. tshawytscha*)—Federally listed as Threatened
- Northern California (NC) Distinct Population Segment (DPS) steelhead (*O. mykiss irideus)*—Federally listed as Threatened
- Southern DPS green sturgeon (*Acipenser medirostris*) —Federally listed as Threatened
- Southern DPS eulachon (*Thaleichthys pacificus*) —Federally listed as Threatened
- Tidewater goby (*Eucyclogobius newberryi*) —Federally listed as Endangered.

Table 1 summarizes all federally listed fish species and designated critical habitat included on the USFWS and NMFS lists and the potential for their occurrence in the proposed action area.

Table 1. Federally Listed Species, Species Proposed for Listing, and Critical Habitat Potentially Occurring or Known to Occur in the Project Area

Common Name *(Scientific Name)*	Federal Status	Present/Absent	Determination
SONCC ESU coho salmon (*O. kisutch*)	Threatened	Present. Humboldt Bay estuaries are used for migration and rearing. SONCC coho salmon are known to occur in Humboldt Bay tributaries including Eureka Slough-Freshwater Creek and Brainard's Slough-Rocky Gulch. Critical habitat is present.	(See discussion in Section 5.8.1)

Table 1. Federally Listed Species, Species Proposed for Listing, and Critical Habitat Potentially Occurring or Known to Occur in the Project Area

Common Name *(Scientific Name)*	Federal Status	Present/Absent	Determination
CC ESU Chinook salmon (*O. tshawytscha*)	Threatened	Present. Humboldt Bay estuaries are used for migration and rearing. Freshwater Creek located to the south of the action area has a growing population (Good et al, 2005). Critical habitat is present.	(See discussion in Section 5.8.1)
NC DPS steelhead (*O. mykiss irideus*)	Threatened	Present. Humboldt Bay estuaries are used for migration and rearing. Very few have been observed in Brainard's Slough. Critical habitat is present.	(See discussion in Section 5.8.1)
Tidewater goby *(Eucyclogobius newberryi)*	Endangered	Potentially Present. Tidewater goby are found in estuarine areas and freshwater lagoons. The proposed action area does not provide the appropriate habitat for tidewater goby. Critical habitat is absent.	USFWS provided a letter of concurrence (LOC) for a programmatic informal consultation from Caltrans covering small project activities in Humboldt County (U.S. Fish and Wildlife Service 2011). Caltrans will be responsible for completing its associated tracking form when the Natural Environment Study is final.
Southern DPS Green sturgeon *(Acipenser medirostris)*	Threatened	Present. The Southern DPS green sturgeon is known only to spawn in the Sacramento River. Adult sturgeon are present in Humboldt Bay on occasion. Critical habitat is present.	(See discussion in Section 5.8.1)
Southern DPS eulachon (*Thaleichthys pacificus*)	Threatened	Potential Habitat. Suitable habitat for eulachon in the action area is limited to rearing and potential foraging area. Adults may have historically utilized Humboldt Bay, but no recent occurrences are documented (Jennings 1996). Critical habitat is absent.	(See discussion in Section 5.8.1)

1.2.1. Candidate Species

For purposes of addressing long-lead projects or potential changes in species listing, it is important to include federal candidate species that may become listed during project development or implementation.

The following federal candidate species may be affected by the Proposed Action:

- Longfin smelt (*Spirinchus thaleichthys*), Bay-Delta DPS, [note: longfin smelt in California are listed as a "threatened species" under the state law]. This DPS of longfin smelt may occur in marine waters, primarily off San Francisco Bay, but spawning congregations are limited to the San Francisco Bay-Delta estuary, and accordingly, would not likely occur in the action area (USFWS 2008).

1.2.2. Critical Habitat

The proposed action addressed within this document falls within designated critical habitat for the listed SONCC coho salmon, CC Chinook salmon, NC steelhead, and the Southern DPS green sturgeon.

1.3. Consultation History

The Project team (Humboldt County, Consultant Team, and Caltrans) met with federal and state fish and wildlife management agencies on August 31, 2017, to discuss locations where impacts to biological resources would be most likely, based on the current approach to the project design, and to seek input on key issues of concern to the fish and wildlife agencies. A field site visit was held on October 10, 2017 with representatives of the USFWS and CDFW able to attend. A follow up teleconference with NMFS was held on October 17, 2017 because they were unable to attend the field site visit. Gregory Schmidt, USFWS-Arcata, was contacted on November 7, 2017 to provide relevant local information on the potential for presence of tidewater goby in the action area. Additional technical assistance concerning appropriate hydroacoustic analytical approaches for the specific environmental conditions of the action area was conducted via an email exchange of information between Greg Goldsworthy, NMFS-Arcata, and the Consultant Team, on December 21, 2017.

1.4. Description of Proposed Action

The proposed project is intended to provide non-motorized (primarily pedestrian and bike) transportation and recreational access connecting the City of Eureka's Waterfront Trail to the City of Arcata's Humboldt Bay Trail North via a multi-use trail with a goal of meeting Caltrans Class I standards. The project would connect to the existing Eureka Waterfront Trail, starting at in the south end of the Eureka Slough Bridge along the NCRA railroad transportation corridor and would continue north towards Brainard's Slough.

1.4.1. Project Location

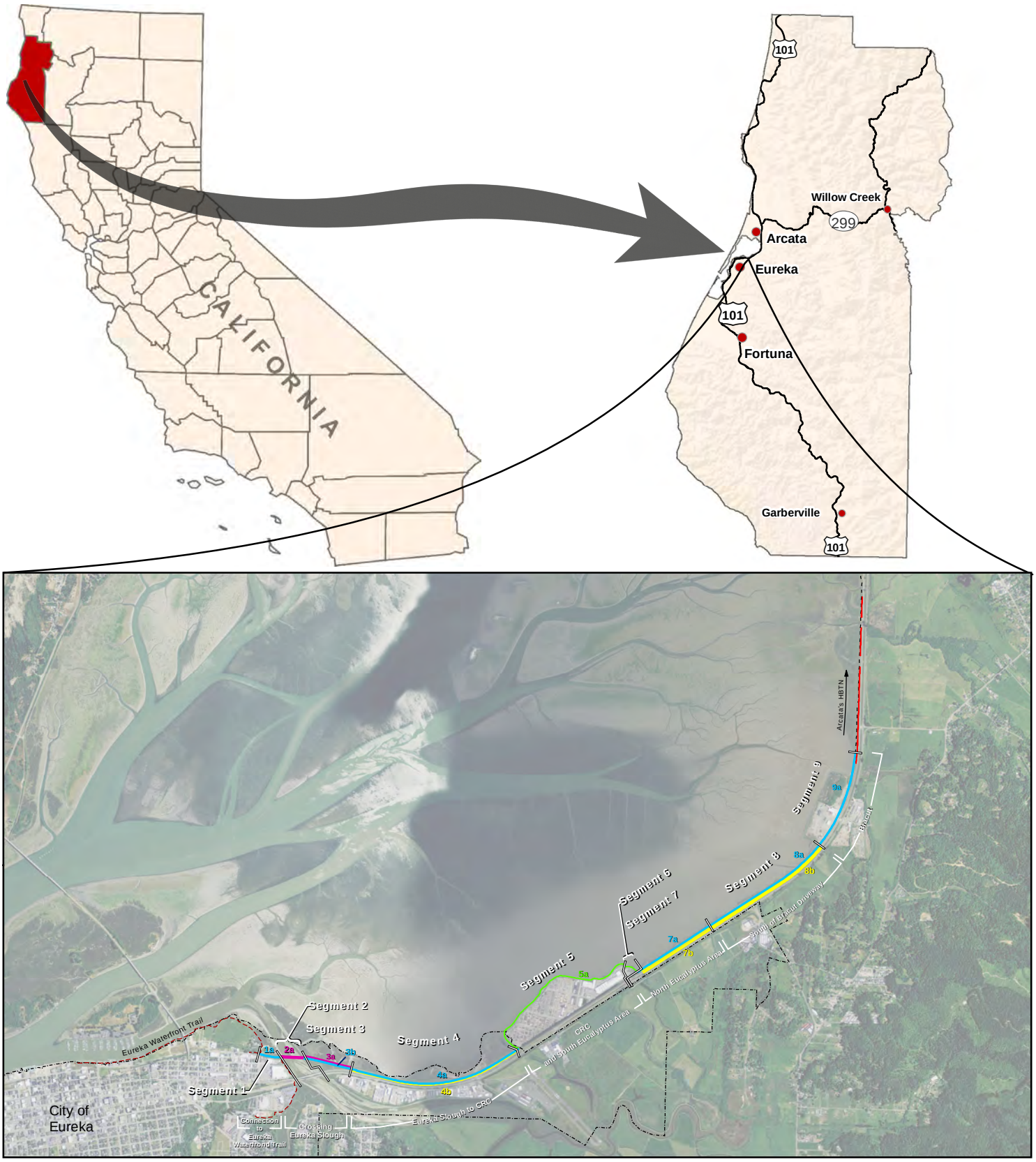
The Humboldt Bay Trail South Project would provide non-motorized (primarily pedestrian and bike) transportation and recreational access by creating a Class I multi-use trail connection between the City of Eureka's Waterfront Trail and the City of Arcata's Humboldt Bay Trail North. Beginning at its southern terminus at the south end of the Eureka Slough Bridge, the project would make use of the unused NCRA railroad transportation corridor as it extends north towards Brainard's Slough. For the purposes of this study, the approximately 4.2-mile-long Humboldt Bay Trail South alignment was divided into nine unique segments, in addition, a narrow extension continues north adjacent to the recently completed Humboldt Bay Trail North segment, where installation of a cable barrier is proposed between the pedestrian trail and Highway 101 (as shown on Figure 1):

- Segment 1: Connection to Eureka Waterfront Trail
- Segment 2: Eureka Slough Crossing
- Segment 3: Eureka Slough North
- Segment 4: Eureka Slough to CRC
- Segment 5: CRC and South Eucalyptus Area
- Segment 6: CRC North Bay Crossing
- Segment 7: North Eucalyptus Area
- Segment 8: South of Bracut
- Segment 9: Bracut

Following is a description of the project design standards and approach that would be implemented under the proposed project, including the trail segment where these project features would be used.

1.4.2. Proposed Construction Design and Methods

The design standard goal is to achieve the standards of a Class I Bikeway in accordance to Chapter 1000 of the Caltrans Highway Design Manual (2016). In addition, the project will be designed to conform to other applicable standards, including the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities, Fourth Edition (2012); California Manual of Uniform Traffic Control Devices (CA MUTCD) (2014); the 2010 Americans with Disabilities Act (ADA) Standards for Accessibility Design; Chapter 11B of the 2016 California Building Code; General Order No. 26-D from the California Public Utilities Commission; and the NCRA Trail Guidelines (2009).



TRAIL LOCATION TYPE

- NCRA RwT (N of tracks)
- NCRA RwT (S of tracks)
- On Railroad (temporary)
- Highway-with-Trail
- Private (CRC)
- Cable Railing - Humboldt Bay Trail North
- Segment Break

Trail Connections

- Eureka Waterfront Trail
- Humboldt Bay Trail North

Eureka City Limits

Paper Size 8.5" x 11" (ANSI A)
0 750 1,500 2,250 3,000
Feet
Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California I FIPS 0401 Feet

N

2a Alignment

"Text" Project Reach

Humboldt County Public Works Department
Humboldt Bay Trail - Bay Trail South
(Eureka to Bracut)

Job Number 11110166
Revision B
Date 25 Oct 2017

Vicinity Map

Figure 1

718 Third Street Eureka CA 95501 USA T 707 443 8326 F 707 444 8330 E eureka@ghd.com W www.ghd.com

G:\111\11110166 Humboldt Bay Trail South PA&ED PS&E\08-GIS\Maps\Figures\ESHA\11110166_01_Vicinity_RevB.mxd

The trail will be designed to accommodate the expected volume and diversity of users, which includes a range of ages, experience levels, speeds, trip purposes, and mobility modes. Consideration will be given to user safety and ensuring that the project will meet the needs of the public and minimize potential conflicts. Particular constraints within the trail alignment may warrant adjustments to the standards to address site specific issues. Throughout the project alignment, the following design standards would be applied as the goal for design:

1.4.2.1. DESIGN STANDARDS AND APPROACH

Throughout the project alignment, the following design standards would be applied as the goal for design:

Trail Width and Surface (All Project Segments)

In accordance with the County of Humboldt's Basis of Design Report for Trail Width (March 31, 2016), a context-based approach will be utilized for selecting the appropriate trail width for the project. Trail width is a key design parameter for user safety. Trails that are too narrow can result in a high rate of collisions or a perception of unsafe conditions, which could deter use and result in a failure to achieve the desired outcomes and benefits. Trail width is also a key design parameter for the quality of the user experience, with wider trails typically resulting in a higher quality user experience.

In order to satisfy the project need, while minimizing impacts on environmental sensitive areas, the standard trail would consist of a 10-foot-wide asphalt track with 2-foot-wide gravel shoulders on each side. A narrower trail width may be used in isolated areas, where special situations preclude construction of the standard trail width. In accordance to Class I bikeway design and accessibility standards, the trail would be designed with a two percent or less cross slope and a five percent or less running slope. In areas where the project crosses tidally influenced waters, the standard trail would consist of a bridge (described below). The proposed trail may include intersection lighting at the Bracut driveway intersection. This additional lighting would be located approximately 0.25 miles from the proposed bridge at Brainard's Slough and 750 feet from the average high-tide water edge of Humboldt Bay to the west.

Streetscape Improvements (All Project Segments)

Viewing Platforms and Interpretive Signage

The viewing platforms and interpretive sign areas associated with the project may consist of either low-profile landscaped areas or raised deck platforms comprised of steel, asphalt-concrete, concrete, or wood or rail tie borders filled with crushed rock. Each platform/sign area may include interpretive signs, benches, trash receptacles and landscaping. These areas

would encourage an appreciation of the environment and the socio-cultural history of the area by providing opportunities for nature and cultural study. The opportunities include providing up-close views of local vegetation/habitats, mid-range views of Eureka Slough/Humboldt Bay, long-range views of the surrounding ridge lines, and interpretive signs that provide information about local habitats and cultural/historical sites.

Directional and Wayfinding Signage:

Directional and wayfinding signage would be installed at regular intervals to inform trail users of nearby connections to surface streets and nearby destinations.

Trailheads:

Trailheads associated with the project may include new or refurbished parking spaces, interpretive signs, gateway signage, kiosks, benches, trash receptacles, and landscaping. The proposed project does not include a defined trailhead at this time, but may be considered in the future as a separate project.

Structural Pavement Sections (All Project Segments)

The trail is anticipated to have a typical pavement structural section that has approximately 12 inches of aggregate base and approximately 3 inches of asphalt concrete. In areas of poor soils, the structural section may be increased to up to 3 feet of aggregate/engineered fill base or other soil stabilization measures such as the use of geotextiles and increased structural section depth.

California Redwood Company Area (Project Segment 5)

Approximately 1.1 miles of the proposed trail alignment follows the outer perimeter levee surrounding the CRC. The existing levee varies in width from 12 to more than 30 feet wide and averages approximately 10 feet higher than the adjacent Humboldt Bay mud flats. The standard trail section would be maintained along the levee, but may include additional fencing and/or slope/drop-off protection. In general, the trail elevation is proposed to be very similar to that of the existing levee; however, the elevation profile would vary as needed to comply with the standards and other design elements. Portions of the levee that are narrow or low in elevation may need additional embankment to widen or raise the elevation of the trail. Sections may also require reinforced steepened slopes or short retaining systems (e.g.., gabion walls) to limit necessary embankment fill. If widening is necessary, it would generally occur on the CRC side of the levee rather than towards Humboldt Bay. The additional embankment would be added along the inside slope at an approximate 1.5:1 slope. In most cases, the added embankment would result in fill into the inboard ditch/wetlands.

When this occurs, the inboard ditch would be reconstructed to provide for the necessary capacity and to also mitigate onsite for wetlands impacts associated with inboard ditch. The CRC portion of the trail is proposed to be connected to the adjacent rail-with-trail sections (on both ends) by bridges used to cross a mud flat (north end) and saltmarsh (south end) and provide a smooth transition back on to the main trail alignment located between the railroad tracks and highway. Proposed bridge designs are described below.

Eureka Slough Crossing (Project Segments 2 and 3)

Currently, Highway 101 crosses the Eureka Slough, but includes no accommodations for bike or pedestrian transit meeting current standards. The highway's bridge structures (northbound and southbound bridges) are planned to be replaced in the future; however, no specific dates have been determined. Caltrans has committed to replacing the structure with one that would include bike and pedestrian facilities, but until that time, an alternate route will be required.

Approximately 700 feet to the northwest of the Highway 101 Eureka Slough crossing is via an existing railroad bridge owned by NCRA. The bridge is currently unused as there is no rail service within the area. If rail service were to resume, significant maintenance or improvements would be required to bring the system to operational standards.

The proposed trail would occupy the railroad bridge by modifying the existing structure to accommodate the trail. One option is to remove the rails and ties and stockpile them for future reinstallation and to install an asphalt, concrete, or a wooden surface over the existing bridge surface. Another option is to leave the existing rails and ties in place and install an asphalt, concrete, or wooded surface over the rails. A third option would be to install asphalt, concrete, wooden, or pre-manufactured surface up to the level of the rails that would allow for cooperative use with trains, if trains were ever to resume use of the rails. All options would include new safety railing and minor cosmetic improvements to the bridge's appearance (such as painting over graffiti). During construction, management and protection measures would be implemented to prevent construction debris and other materials from falling from the bridge and entering the waterway below.

In the future, when Caltrans replaces the southbound Highway 101 bridge structure with one that included accommodations for bikes and pedestrians, the trail would be rerouted over the new Highway 101 bridge structure. After crossing the highway bridge, the trail would continue along the highway until it connects with the trail approximately 1,000 linear feet to the north. At that time, access across the railroad bridge would likely discontinue and all

pedestrian and trail improvements would be removed. The environmental issues associated with any future Eureka Slough crossing on Highway 101, connection route to and from the bridge, and the deconstruction of the trail improvements on the railroad bridge would need to be analyzed in the future as such plans were developed. Future possible projects were not analyzed in this document.

Brainard's Slough Crossing (Project Segment 9)

Brainard's Slough forms from the confluence of Washington Gulch and Rocky Gulch drainages, which is located east of Highway 101 before crossing under the highway towards the bay via a single reinforced box culvert, then under the NCRA railroad tracks. Two 48-inch diameter corrugated metal pipe culverts at the railroad crossing are significantly damaged and do not currently function. Replacement of these two damaged culverts with a pedestrian bridge structure along with bank rehabilitation in the vicinity of the trail crossing will be required for construction of the trail.

The bridge structure would need to be approximately 120 feet long. The bridge would consist of a single-span, pre-manufactured structural section composed of steel, aluminum, fiberglass, or concrete. The bridge would be supported on each end by abutments (including wingwalls) supported by up to five 18-inch diameter cast-in-steel-shell (CISS) piles (on each end). Up to 10 piles would be installed to a depth of up to approximately 100 feet below ground surface during periods of low tide. The steel shells would be installed using a vibratory hammer (American Pile driving Equipment Model 200 or similar), which would use a vegetable-based, non-toxic, hydraulic oil, in case of a hydraulic leak in or near Humboldt Bay. Each steel shell would be proofed by driving its final 5 feet using a conventional impact pile driver (135 kilojoules) to achieve design tip elevation and verify load capacity. No pile driving would occur in water, as installation would occur during low tides.

The existing failed culverts and debris (including timber ties, supports and rock debris in the channel) would be removed, the remaining rail embankment regraded (as-needed), and rip-rap would be installed (including on the bay side) to stabilize the embankment/shoreline and reduce the potential for ongoing erosion.

Prior to completing the final design, the County will complete a geotechnical analysis to determine the bearing capacity of the soils and the size and target depth of piles.

CRC Bridge Structures (Project Segments 4, 5, 6, and 7)

Two bridge structures would be constructed at the north and south extents of the CRC property for trail portions that cross tidally influenced waters. The bridges would be at least 10-feet wide between railings and would be comprised of pre-manufactured wood, fiberglass, steel, aluminum, or concrete. The northern CRC bridge is anticipated to be a three-span bridge supported with four piers (one on each end and two within the mid-sections located in Humboldt Bay). Each pier is anticipated to be comprised of up to five 18-inch diameter CISS piles. Like the bridge structure proposed for the Brainard's Slough crossing, the steel shells would be installed to a depth of approximately 100 feet below ground surface using a vibratory pile-driver for the majority of the length and an impact hammer to proof each pile as previously described. In order to provide access for cranes on the bay mudflats, temporary sheet piles and washed coarse-grained aggregate fill would be used to construct an access road and landings along the alignment of the trail bridge. The sheet piles would be installed approximately 30 feet below ground surface using vibratory methods and the aggregate fill would be wrapped in geotextile fabric to separate native and fill soils. Water-filled bladders may also be used to construct a coffer dam to isolate the work area from the tidal bay waters. Isolating the work area with water-filled bladders would allow for work within the bay to be expedited as work would not be restricted to periods of low tides only. The coffer dam method would also reduce the likelihood of construction-generated sediment entering the bay and would reduce the possibility of entrapment of fish and other organisms in and around the temporary access road and work pad landings.

The southern CRC bridge would be a single-span bridge approximately 80 feet in length. Like the Brainard's Slough bridge, the southern bridge is anticipated to be supported on each end by abutments with a foundation of up to four 18-inch diameter CISS piles driven approximately 100 feet deep. The piles would be installed in the same manner and using the same equipment as described for the northern CRC bridge.

The vibratory driver used for the installation of sheet piles and steel shell piles at the north and south extents of the CRC property is anticipated to be operated for approximately 3 hours per day for a total of 20 days. It is anticipated that the proofing of the piles (up to 28 total) would require approximately 100 blows per pile driving 3 to 4 piles per day. The installation of sheet piles and steel shells would occur out of water during low tide or, in the case of the northern CRC bridge, be isolated by coffer dams to avoid and minimize hydroacoustic impacts (barotraumas) to fish and other marine organisms.

Prior to completing the final design, the County will complete a geotechnical analysis to determine the bearing capacity of the soils and the size and target depth of piles.

Retaining Structures (Project Segments 5, 6, 7, and 8)

Retaining structures may be used at each end of the bridges (abutment wingwalls) and also along the segment of the trail beginning at the northwest corner of the CRC property and extending north-westerly for a distance of approximately 2,700 linear feet. This segment of trail north of CRC would be located between the railroad and the Highway 101 corridor, either directly adjacent to the railroad or directly adjacent to the highway (behind an existing metal beam guardrail). A retaining wall structure may be required in order to maintain minimum setbacks from the NCRA tracks or Highway 101 (depending on the alignment) while minimizing encroachment into the existing drainage ditch that is located between the railroad and highway. The structure may consist of cast-in-place concrete or soldier pile retaining wall. If soldier pile retaining wall is used, 30- to 40-foot long reinforced concrete or steel H section soldier piles would be driven at 8-foot intervals and approximately 22-34 feet below ground surface leaving approximately 6–8 feet exposed above the ground surface. Soldier piles would need to be driven using the same (or similar) pile driver that would be used for proofing the CISS pilings. Lagging (concrete or treated timber) would be used to retain the backfill. It is anticipated that the soldier piles (approximately 340 total) would require 100 blows per pile driving approximately 15 piles per day. The top of the retaining structures would not exceed the elevation of the railroad and the height to the ground surface is expected to be 6 feet or less. For safety purposes, the retaining structure would include railings that are designed to comply with the California Building Code

Eucalyptus Trees (Project Segments 5, 6, and 7)

A grove of existing aging eucalyptus trees located along the NCRA railroad north of the CRC property would need to be removed as part of the project. Some trees are in direct conflict with the trail alignment and all pose a safety hazard to trail users (i.e., falling debris and ground litter). The trees would be limbed and trunks rigged, felled, and lowered in sections (i.e., sectional felling). Tree stumps would be removed to the extent practicable through excavating, grinding or other means, with remaining stumps and root systems treated with an herbicide to prevent regrowth. Required equipment and workers would access the trees from both the highway and railroad sides. The removal operation would likely require the temporary closure of one or more lanes of Highway 101. The project would also remove all eucalyptus saplings in the vicinity of the trail (generally from the highway to the railroad prism).

Shoreline Protection (Project Segments 6, 7, 8, and 9)

As previously discussed, the project includes localized shoreline restoration and protection at the Brainard's Slough crossing. In addition to Brainard's Slough, there are multiple areas along the project where the existing railroad fill prism has deteriorated and shows significant signs of erosion as a result of wave action from Humboldt Bay. The area between CRC and Bracut is generally in the worst condition with more areas of deterioration between Eureka Slough and CRC. In order to protect the trail prism from future erosion and damage, sections of the rail prism would be reconstructed and armored with rock rip-rap. The rock armoring is anticipated along both the bay side and highway side to protect against direct wind and wave action and wash over erosion. The shoreline protection along the bay side (the western side of the railroad prism) would be limited (horizontally) to the bayward extent of the existing rip-rap. No additional encroachment into the bay beyond the toe of existing rock armoring is proposed.

Striping and Vehicle Control (All Project Segments)

The trail may include a centerline stripe throughout or at specific locations only, such as driveway crossings, curves, or bridge approaches. Standard trail-related traffic-control signage would be installed in order to comply with Class I standards and MUTCD requirements. At locations where the trail intersects a vehicular roadway, removable bollards would be installed to prevent motorized vehicles from entering the trail. Authorized personnel (e.g., police, emergency-responders, County/City maintenance crews, etc.) would be able to remove the bollards and temporarily access some portions of the trail with motorized vehicles.

Drainage (All Project Segments)

The trail would typically have a two percent or less cross slope to allow surface water to flow off of the trail surface. When the trail is directly adjacent to the railroad or the highway facilities, the cross slope of the trail would slant away from the railroad/highway in order to convey runoff towards the drainage ditch. In locations where the existing drainage ditches are in close proximity to the proposed trail alignment, culverts may need to be extended or added. Similarly, in cases where the trail's fill prism encroaches into the existing drainage ditch causing a reduction in capacity, the drainage ditch may need to be reconstructed at approximately the same grade and depth, but at a location (horizontally) offset from the original position.

Barriers and Fencing (All Project Segments)

Safety railing and fencing is proposed along retaining walls, viewing platforms, the CRC levee, and at the edge of the trail when adjacent to steep embankments. The railing and fencing would be constructed from wood or metal material.

High-tension cable barriers and metal beam guard rail would be utilized between Highway 101 and the trail to provide additional protection of trail users from errant vehicles. The cable barrier would be installed along portions of the proposed Humboldt Bay Trail South project, as well as along the existing Humboldt Bay Trail North project. The high-tension cable barrier would be set back approximately 10 feet from the edge of trail and approximately 8 to 12 feet from the edge of the highway shoulder. The cable barrier would consist of steel wire ropes (typically 4 strands) mounted on steel posts secured in concrete foundations. A 2-foot wide concrete weed mat would be installed along the length of the cable barrier. Figure 2 shows a typical cable barrier along a highway.

Figure 2. Typical Cable Barrier Fencing

Where the trail is less than 10 feet from the edge of the highway shoulder, a metal beam guard rail or other positive barrier will be required. In this situation the trail would be located approximately 3 feet behind the metal beam guard rail wood posts. A weed control

mat would be installed along the length of new metal beam guardrail to help control vegetation.

Billboards (Project Segments 7 and 8)

There are four billboards in the vicinity of the project, all of which are situated on private property. Three of the billboards are located outside the project area on the bay side of the railroad prism. One of the billboards is located within the project area between the highway and railroad. Depending on the final trail alignment, the trail may narrowly avoid this billboard, or the billboard may conflict with the trail, which may result in removal or relocation of the billboard. The future disposition of the remaining three billboards located outside the project area is unknown at this time and are not analyzed in this document.

1.5. Project Construction

Construction Schedule

Construction of the project is expected to begin in late spring and would be completed in approximately six months. Anticipated daytime work hours would be 7:00 a.m. to 7:00 p.m., Monday through Friday, with occasional work on Saturdays. Construction on Sundays and on legal and County holidays is not currently anticipated, except for emergencies, or with prior approval from the County.

Construction Staging, Activities and Equipment

Construction staging is planned at four discrete areas located on either end of the CRC and Bracut Industrial Park property. These four discrete staging areas are in addition to general staging areas that are anticipated within the project work area and the Caltrans and NCRA right-of-ways. These four discrete staging areas are located on private property and use would be dependent on approval from the landowners.

Construction activities would primarily include removal of trees and vegetation, excavation and grading, bridge foundation construction and pre-manufactured bridge installation, trail paving, fencing, and signage, along various segments of the project alignment. All construction activities would be accompanied by both temporary and permanent erosion and sediment control best management practices (BMPs).

Construction equipment required for trail construction would include: tracked excavators, backhoes, graders, bulldozers, dump trucks, rollers, paving machines, cranes, water trucks, drill rigs, vibratory and impact hammer pile-drivers, and pick-up trucks. Equipment required for pre-manufactured bridge assembly and placement would include excavators and cranes.

Roadways that would be used for construction access and the staging areas include Highway 101, the entrance into CRC, and the entrance into Bracut Industrial Park. It is not anticipated that any temporary utility extensions, such as electric power or water, would be required for construction.

Construction Access and Hauling Traffic

The anticipated haul truck routes to the project area include Highway 101 from the north and south. The number of construction-related vehicles traveling to and from project area would vary on a daily basis. It is anticipated that up to 40 haul truck round trips would occur on a peak day. In addition, it is anticipated that construction crew trips would require up to eight round trips per day. Therefore, for the purposes of analysis, on any one day during construction, up to 48 vehicle round trips could occur.

Traffic Control

In accordance with jurisdictional requirements, the construction contractor would be required to obtain an encroachment permit from the County, the City of Eureka, NCRA, and Caltrans prior to beginning the work along Highway 101. As part of the encroachment permit process, the construction contractor will be required to prepare a traffic control plan for review and acceptance of planned work within the public right-of-way. The development and implementation of a traffic control plan would include, but not necessarily be limited to: temporary traffic control systems, delineators, signs, and flaggers conforming to the current California Manual of Uniform Traffic Control Devices.

Groundwater Dewatering

Excavation into groundwater and dewatering is anticipated. Temporary groundwater dewatering would be conducted to provide a dry work area. Dewatering would involve pumping water out of a trench or excavation. Groundwater would typically be pumped to Baker tanks (or other similar type of settling tank) or into a dewatering bag. Following the settling process provided by a tank or filter, the water would be used for dust control and compaction. Clarified water from Baker tanks would not be discharged into wetlands or any water bodies.

Coffer Dam

In order to provide access for construction equipment at the CRC north bridge, a small area of intertidal mudflat would be temporarily isolated from the bay's tidal inundation by a coffer dam to expedite construction. Sheet piles or water-filled bladders may be used to construct the coffer dam to isolate the work area from the tidal bay waters. Isolating the work area

with water-filled bladders would allow for work within the bay to be expedited because work would not be restricted to periods of low tides only. The cofferdam would be constructed in stages during low tide periods and in a way that allows for voluntary movement of fish and other organisms out of the work area during the ebbing tide prior to sealing off the enclosure. Any pooled water remaining would be surveyed by a qualified biologist and any stranded organisms will be moved safely away from the action area. The proposed action would limit this activity to the mid-to late-summer period, which in combination with performing the final sealing of the coffer dam during an ebb tide, would reduce the probability of stranding any of the listed species to a discountable level.

Site Restoration and Demobilization

Following construction, the contractor would demobilize and remove equipment, supplies, and construction wastes. The disturbed areas along the project alignment would be stabilized with a combination of grass seed (broadcast or hydroseed), straw mulch, rolled erosion control fabric, and other plantings/vegetation. Other disturbed areas along the project alignment would be restored to general pre-construction conditions.

1.5.1. Maintenance and Operation

The trail would be used for non-motorized transportation and recreation, including but not limited to walking, bicycling, running, skateboarding, roller skating, and dog-walking. Following construction, general operation and maintenance activities associated with the proposed trail would be the responsibility of the County of Humboldt, the City of Eureka, and/or Caltrans, and include annual inspections, cleaning, repaving, painting, and repairs, as needed. Operation and maintenance of the project would generate on average, less than one traffic trip per week.

Motorized access would be limited to light maintenance and emergency service vehicles. Access would be gained at trail/roadway crossings equipped with secured, but removable bollards to prevent unintended vehicular access.

1.5.2. Authorities and Discretion

The key state and federal discretionary actions and authorities affecting the proposed action and considered in preparing this BA/EFHA include the following:

Statewide Transportation Improvement Program (STIP). California's STIP integrates and provides guidance and prioritization for improvement of both state and federally authorized and funded transportation projects throughout California. The STIP is documented in a five-year plan that is updated biennially, in even-numbered years, with each new STIP adding two

new years to prior programming commitments for future allocations of certain state transportation funds for state highway improvements, intercity rail, and regional highway and transit improvements. The Humboldt Bay Trail South Project is supported through the STIP administered by Caltrans' District 1 Local Assistance Program.

Endangered Species Act. Sections 7 and 10 of the ESA provide a method for permitting an action that may result in "incidental take" of a federally listed species. Incidental take refers to take of a listed species that is incidental to, but not the primary purpose of, an otherwise lawful activity. Incidental take is permitted under Section 7 for projects on federal land or involving a federal action, while Section 10 provides a method for permitting incidental take resulting from state or private action. The lead federal action agency, Caltrans on behalf of the Federal Highways Administration in this case, must prepare an information package on the potential of a proposed action to affect listed species, referred to as a BA, and consult with the USFWS and NMFS, depending on the species affected and respective jurisdictions of these agencies.

Section 9 of the federal ESA prohibits acts that would result in the "take" of threatened or endangered plant and/or animal species, including fish. Take is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." The term "harm" includes any act which actually kills or injures fish or wildlife or modifies or degrades habitat such that it significantly impairs essential behavioral patterns of fish or wildlife, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR Part 22).

Magnuson-Stevens Fisheries Conservation and Management Act. The MSFCMA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a federal fisheries management plan. This act requires federal agencies to consult with NMFS on all actions or proposed actions authorized, funded, or undertaken by the agency, that may adversely affect EFH (MSFCMA §305[b][2]). A component of this consultation process is the preparation and submittal of an EFH assessment which is included as a chapter (Chapter 6) in this BA/EFHA.

Federal Clean Water Act Sections 401 and 404. The objective of the Clean Water Act (CWA, 1977, as amended) is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. In 1987, the U.S. Army Corps of Engineers (Corps) published a manual standardizing the manner in which wetlands were to be delineated

nationwide. To determine whether areas that appear to be wetlands are subject to Corps jurisdiction (i.e., are "jurisdictional" wetlands), a wetlands delineation must be performed that maps the areas meeting the three-parameter wetland definition (i.e., presence of dominant hydrophytic vegetation, hydric soils, and wetland hydrology) and the resulting map of the wetland boundaries verified in writing by the Corps. In addition to verifying wetlands for potential jurisdiction, the Corps is responsible for the issuance of permits for projects that propose the filling of wetlands. Any permanent loss of a jurisdictional wetland as a result of project construction activities is considered a significant impact. Permits under Section 404 of the CWA, as amended, are required for the placement of dredged or fill materials into all waters of the United States, including wetlands and "other waters." Projects are permitted under either individual or general (e.g., nationwide) permits. Section 401 of the CWA requires that a project proponent obtain a water quality certification for projects requiring a federal permit to allow for discharges of dredged or fill material (i.e., CWA Section 404 permits).

1.5.3. Define Action Area

The action area includes those areas of land, water, and air that would 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 is determined in part by the proposed activities, site geography, topography, and hydrology, and by an understanding of the distribution, habitat requirements, phenology, and vulnerability of special-status species potentially occurring in the project area. The action area boundary encompasses approximately 116.8 acres with 200 feet of buffer around the proposed bridges to account for potential hydroacoustic and turbidity impacts to aquatic organisms (Figure 3).

1.5.4. Conservation Measures

This section describes Conservation Measures to protect natural resources during implementation of the proposed action.

1.5.4.1. CONSERVATION MEASURE #1 VIBRATORY PILE DRIVING

To minimize the potential hydroacoustic effects on fish of driving piles for bridge footings in and adjacent to tidally influenced stream/slough channels ("in-channel") and on intertidal mudflat areas ("in-bay")1, a vibratory driver will be used to the maximum extent practicable.

[1] For the purposes of this BA/EFHA, "in-channel" and "in-bay" terms are defined to mean the areas of flood-prone stream and slough channel cross-sections and tidally-influenced slough channels and bay bottom mudflats.

It is anticipated that piles would need to be proofed by driving the final 5 feet with an impact hammer to achieve design tip elevation and to verify load capacity.

1.5.4.2. CONSERVATION MEASURE #2 LIMITED OPERATIONS PERIOD

To protect the most vulnerable life stages of sensitive fish species that occur within the action area, all in-channel and in-bay work would be restricted to the period between July 1 and September 31. This seasonal work window correlates to the period of the year when sensitive fish species are least likely to occur in the action area. To further reduce the potential for hydroacoustic effects on fish potentially occurring in the action area, all pile driving, using either vibratory or impact hammers, of piles placed in-channel and in-bay mudflat areas will be scheduled to occur between the latter 2-hours of outgoing tides and beginning 2-hours of incoming tides, when tidal inundation of work areas is minimal and so that all pile driving will occur out of the water.

Action Area
Staging Areas

N

0 750 1,500 3,000
Feet

G:\Projects\15_184_000_Humboldt_Trail\GIS\Working_MXDs\15_184_000_Figure_3_Action_Area.mxd tmoore 12/22/2017

Stantec

Humboldt Bay Trail South Project

Figure 3
Humboldt Bay Trail South Action Area

1.5.4.3. CONSERVATION MEASURE #3: EROSION AND SEDIMENTATION CONTROL

Erosion control measures shall be implemented during construction of the proposed action. These measures shall conform to the provisions in Sections 20-2 and 20-3 of the Caltrans Standard Specifications and the special provisions included in the contract for the proposed action. Such provisions include the preparation of a SWPPP, which describes and illustrates the best management practices (BMPs) at the proposed action sites. Erosion control measures to be included in the SWPPP or to be implemented by the City include, but are not limited to, the following:

- To the maximum extent practicable, activities that increase the erosion potential in the action area shall be restricted to the relatively dry summer and early fall period to prevent or minimize the potential for rainfall events to transport sediment to surface water features. In-channel and in-bay construction activities would be restricted to the period of July 1st–September 31st. Upland construction would likely occur throughout the year as long as work activities comply with the conservation and avoidance and minimization measures identified herein and for the protection of other sensitive or special-status plant or animal species. For upland construction activities that must take place during the late–fall, winter, or spring (e.g., vegetation removal prior to avian nesting periods), then temporary erosion and sediment control structures shall be in place and operational at the end of each construction day and maintained until permanent erosion control structures are in place.
- Areas where wetland and upland vegetation are to be removed shall be clearly identified in the construction documents and reviewed by the County prior to issuing for bid.
- Within 10 days of completion of construction, in those areas where subsequent ground disturbance will not occur for 10 calendar days or more, disturbed areas shall be temporarily stabilized to reduce the potential for short-term erosion. Prior to a rain event or when there is a greater than 50 percent possibility of rain within the next 24 hours, as forecasted by the National Weather Service, appropriate BMPs will be installed upon completion of the day's activities to control erosion and prevent sediment laden stormwater from leaving the construction area.
- Suitable perimeter control BMPs, such as silt fences, or straw wattles, shall be placed below all construction activities at the edge of surface water features to intercept sediment before it reaches the waterway. These BMPs shall be installed prior to any clearing or grading activities.

- If spoil (or stockpile) sites are used, they shall be located such that they do not drain directly into a surface water feature, if possible. If a spoil site drains into a surface water feature, swales shall be constructed to intercept sediment before it reaches the feature. Spoil sites shall be graded and revegetated to reduce the potential for erosion.
- Sediment control measures shall be in place prior to the onset of the rainy season and will be monitored and maintained in good working condition until disturbed areas have been revegetated.

1.5.4.4. CONSERVATION MEASURE #4: PREVENTION OF ACCIDENTAL SPILLS

Construction specifications will include the following measures to reduce potential impacts to vegetation and aquatic habitat resources in the action area associated with accidental spills of pollutants (e.g., fuel, oil, and grease):

- A site-specific spill prevention plan shall be implemented for potentially hazardous materials. The plan shall include the proper handling and storage of all potentially hazardous materials, as well as the proper procedures for cleaning up and reporting any spills. If necessary, containment berms shall be constructed to prevent spilled materials from reaching surface water features.
- Equipment shall use non-toxic vegetable oil for operating hydraulic equipment instead of conventional hydraulic fluids.
- Place plastic materials under asphaltic concrete paving equipment, while not in use to catch and/or contain drips and leaks.
- Minimize sand and gravel from any new asphalt from getting into storm drains, streets, and creeks by sweeping. Old or spilled asphalt must be recycled or disposed as approved by the Resident Engineer.
- During any and sweeping operations, petroleum or petroleum covered aggregate must not be allowed to enter any storm drain or water courses. Use silt fence until installation is complete.
- Use only non-toxic substances to coat asphalt transport trucks and asphalt spreading equipment.
- Drainage inlet structures and manholes shall be covered with filter fabric during application of seal coat, tack coat, slurry seal, and/or fog seal.
- Seal coat, tack coat, slurry seal, or fog seal shall not be applied if rainfall is predicted to occur during the application or curing period.

- If dewatering is not required for other purposes, removal of seepage water in the coffered work areas may be ceased after new abutment concrete is poured and is curing (for at least 72 hours after pour) within the form structures, provided that pH of the water inside the cofferdam enclosures and in contact with the concrete forms does not exceed a difference of 0.5 pH units from that of ambient water quality in main slough channel outside of the cofferdams (e.g., 50 ft. upstream and downstream of the new bridge alignment) . If the difference in pH within the cofferdam exceeds 0.5 units, water levels within the coffered area will be kept below the level of the concrete abutment forms and pumped to temporary retention basins or Baker tanks and treated as above for erosion and sediment control.

1.5.4.5. CONSERVATION MEASURE #5: AIR QUALITY/DUST CONTROL

The County shall include provisions in the construction bid documents that the contractor shall implement a dust control program to limit fugitive dust emissions. The dust control program shall include, but not be limited to, the following elements, as appropriate:

- Water inactive construction sites and exposed stockpile sites as necessary, but at least daily during regular work days, or until soils are stable.
- In accordance with California Vehicle Code, all trucks hauling soil and other loose material to and from the construction site shall be covered or should maintain at least 6 in. of freeboard (i.e., minimum vertical distance between top of load and the trailer).
- Any topsoil that is removed for the construction operation shall be stored on-site in piles not to exceed 4 feet in height to allow development of microorganisms prior to resoiling of the construction area. These topsoil piles shall be clearly marked and flagged. Topsoil piles that will not be immediately returned to use shall be revegetated with a non-persistent erosion control mixture.
- Soil piles for backfill shall be marked and flagged separately from native topsoil stockpiles. These soil piles shall also be surrounded by silt fencing, straw wattles, or other sediment barriers or covered unless they are to be immediately used.
- Equipment or manual watering shall be conducted on all stockpiles, dirt/ gravel roads, and exposed or disturbed soil surfaces, as necessary, to reduce airborne dust.

1.5.4.6. CONSERVATION MEASURE #6: PREVENTION OF SPREAD OF INVASIVE SPECIES

The following measures will be implemented to prevent the spread of invasive species:

- All equipment will be weed-free prior to entering the action area.
- If project implementation calls for mulches, they will be weed free.

- Any seed mixes or other vegetative material used for re-vegetation of disturbed sites will consist of locally adapted native plant materials to the extent practicable.
- Any gravels or materials used/placed in waterways will be new, from a local source, or properly disinfected or cleaned prior to installation.
- Any equipment (including boots/waders) and construction equipment shall be properly disinfected or cleaned according to guidance provided by the State of California Aquatic Invasive Species Management Plan prior to in water work to prevent the spread of aquatic invasive species.

1.5.4.7. CONSERVATION MEASURE #7 FISH RESCUE

While it is anticipated that no ESA-listed and other special-status fishes would be present during the seasonally-limited in-channel/in-bay construction window, measures will be implemented to protect non-listed aquatic species that may occur in the vicinity of the proposed project by excluding aquatic organisms from in-channel and in-bay work areas and salvage potentially trapped organisms in areas to be dewatered. Prior to complete dewatering of any in-channel or in-bay work areas, coffer dams or barrier nets may be placed to block off the area. Any fish remaining inside the coffer dams or barriers will be carefully removed by a qualified biologist. To minimize potentially adverse effects to aquatic organisms, all translocation/removal of fishes will be conducted by qualified fisheries biologists. Any fish that cannot be herded by seines from the work areas and must be physically handled will be immediately released in suitable habitat away from the action area, with comparable habitat and water quality conditions. Immediately following completion of in-channel/in-bay work, any coffer dams or block nets will be removed allowing free fish passage through the action area during the remainder of the construction period.

1.5.5. Interrelated and Interdependent Actions

Interrelated and interdependent actions are those that have no significant independent utility apart from the action under consideration, or are part of a larger action and depend on the larger action for their justification (i.e., this action or other actions would not occur “but for” this action). No such related actions are associated with the proposed action.

Chapter 2. Study Methods

2.1. Summary

Special-status fish species and/or special habitats having the potential to occur in the action area were determined, in part, by review of a species list obtained from USFWS and NMFS. On February 13, 2018 a list of federal special-status species with the potential to occur in in the action area was electronically obtained from the USFWS (Appendix A). On February 13, 2018 a list of federal special-status species with the potential to occur in in the action area was electronically obtained from NMFS (Appendix A).

A site visit and literature reviews were used to evaluate and make a determination of whether suitable habitat for the federally listed species occurs in the action area (Table 1). For the purpose of this BA/EFHA—which has been prepared to facilitate consultation with the NMFS under Section 7 of the ESA—the SONCC coho salmon, CC Chinook salmon, NC steelhead, eulachon, and the Southern DPS green sturgeon are discussed in further detail in Chapter 4.

A hydroacoustic impact analysis was completed using the NMFS Pile Driving Calculations model and representative model input criteria from scenarios that most resembled the proposed project (e.g., similar types of piles and geomorphic substrate) available in the "*Technical Guidance for Assessment and Mitigation of Hydroacoustic Effects of Pile Driving on Fish*" (Caltrans 2015).

Regulations state that the physical and biological features (PBFs) essential to the conservation of the listed species include, but are not limited to, space for individual and population growth and normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, and rearing of offspring; and habitats that are protected from disturbance or are representative of the historical geographical and ecological distribution of a species. In the action area, Humboldt Bay and its tributaries are accessible to and include PBFs for the listed fish species considered in this BA. These PBFs occur mainly as rearing habitats, foraging habitats, and migration corridors. The action area is included within designated critical habitat for the listed salmonids and Southern DPS green sturgeon described in this BA.

2.2. Personnel and Survey Dates

- Keith Marine and David Pluth, Biologist, North State Resources, now a part of Stantec (NSR/Stantec). Reconnaissance level aquatic habitat site assessment, October 10, 2017.
- GHD. Botanical survey for CNPS-listed plant species. Various dates May –June 2017.
- GHD. Wetland Delineation. July 2017.

2.3. Resource Agency Coordination and Professional Contacts

NSR/Stantec obtained a list (Consultation Code 08EACT00-2018-SLI-0017 [Appendix A]) of federally listed species and species that are proposed or are candidates for federal listing with the potential to occur in the vicinity of the action area.

A site visit led by representatives from GHD, occurred on October 10, 2017, attendees included representatives from USFWS, CDFW, Caltrans, and NSR/Stantec. A follow up teleconference with NMFS was held on October 17, 2017 because they were unable to attend the field site visit.

On November 6, 2017 NSR/Stantec contacted Michael Wallace, CDFW-Eureka, to request the latest information on salmonid presence within Humboldt Bay. The following day Mr. Wallace provided the latest technical reports.

On November 7, 2017 Gregory Schmidt, USFWS-Arcata, was contacted regarding the potential for presence of tidewater goby in the ditch along the CRC property. With a response received on November 8, 2017, indicating that the ditch in question is not considered suitable habitat for tidewater goby and, therefore, would not be expected to occur in the ditch.

On December 21, 2017, Greg Goldsworthy, NMFS-Arcata, provided additional technical assistance concerning appropriate hydroacoustic analytical approaches for the specific environmental conditions of the action area via an email exchange of information with the Consultant Team.

2.4. Limitations and Assumptions that may Influence Results

The field site visit performed for this BA/EFHA was conducted as an observational survey to characterize the general suitability of habitat for the listed species in the action area, such that

potential habitat-related impacts could be adequately described, not to document the presence or absence of fish species. No other limitations on the use of field studies or desktop analyses are known or were applied to the use of data in this BA/EFHA.

Chapter 3. Environmental Baseline

3.1. Description of the Action Area

The action area is located in the coastal plain of tributaries to Arcata Bay, in the northeast section of Humboldt Bay. The proposed action consists of constructing a trail that would run along the NCRA and Highway 101 corridor between Bracut and the City of Eureka, with a portion of the trail located on the perimeter levee between the California Redwood Company's (CRC) property and Humboldt Bay (Figure 3). In areas where the project intersects tidally influenced waters, the standard trail would consist of bridge structures at the Brainard's Slough crossing and approaches to the CRC property over intertidal mudflats. The existing railroad crossing at Brainard's Slough, which is formed from the confluence of Washington Gulch and Rocky Gulch, is deteriorating. The new trail would be on the inboard side of this crossing and the trail would cross Brainard's Slough via either improved culverts or a bridge structure.

Most of the trail corridor consists of altered soils as a result of cut–and–fill for road development, railroad development, berm/dike installation and manipulation, agricultural uses, urban development, and highway roadbed. Much of the vegetation has similarly been altered from long-term land uses, and consists of many non-native and disturbance-oriented species. Site hydrology has also been historically altered from tidal estuarine to developed rural, urban, and industrial drainage networks with tide control gates (Winzler and Kelly 2010).

The climate of the action area is characterized as cool-summer Mediterranean, with cool, wet winters and cool, foggy summers. Average annual precipitation is approximately 43 inches. Most precipitation falls as rain between the months of October and April. Air temperatures range between an average January high of 55.4 degrees Fahrenheit (ºF), and an average September high of 63.8 ºF. The year-round average high temperature is approximately 59.5 ºF (Western Regional Climate Center 2017).

3.2. Habitat Conditions in the Action Area

The action area is located in the estuarial coastal plain on the eastern edge of Arcata Bay, which is the northeast section of Humboldt Bay. The foothills of the Coast Ranges rise to the east. The proposed project lies within the North Coast region and the Coast Ranges geomorphic province. Soils in the vicinity are generally coarse to fine alluvium deposits

typical of northwest California coastal plains. Near the Bracut area, the soil is of the Hookton Formation, consisting of mainly sandstone with clay and gravel. In much of the action area, non-native soils used as fill for the railroad grade and highway construction are present (Winzler and Kelly 2010).

The waterways in the action area are part of the larger Humboldt Bay ecosystem that accommodates a variety of waterfowl, fish and other aquatic organisms, passerines, and raptors. It is apparent from its elevation relative to tidewater and its geomorphic features that the area surrounding Humboldt Bay historically consisted of estuarine habitat, likely composed of salt marsh and tidal slough channels along with other more brackish water habitats. Although much of the historic estuary has been converted to other land uses, some estuarine habitat still exists. Much of this habitat has been significantly modified and severely degraded by the installation of tide gates and other land management practices. These modifications also have had a pronounced effect on flood routing and sedimentation. Land use in the watershed includes a mix of residential, agricultural, and municipal infrastructure.

Humboldt Bay is the largest estuary in California north of San Francisco. The watershed is 223 square miles in area, though the bay's smaller tributaries only drain a total of approximately 35 square miles. Streamflow in the Humboldt Bay watershed peaks in the winter (November through March) and is lowest during the summer. The four major streams of the Eureka Plain are Jacoby Creek (draining 17 square miles), Freshwater Creek (draining 31 square miles), Elk River (draining 29 square miles), and Salmon Creek (draining 17 square miles). Jacoby and Freshwater creeks drain into Arcata Bay to the north, Elk River into Entrance Bay near Eureka, and Salmon Creek into South Bay.

Brainard's Slough is tidally influenced and formed by the confluences of Rocky Gulch and Washington Gulch. Brainard's Slough flows under Highway 101 via a single box culvert, and then, through two 48-inch corrugated metal culverts under the railroad grade into Humboldt Bay. As previously mentioned, the railroad prism at this location has collapsed due to the failure of two culverts and is in need of repair.

Freshwater Creek enters Humboldt Bay just north of Eureka via Eureka Slough. Freshwater Creek is a fourth order stream with a drainage area of approximately 35.6 square miles. Freshwater Creek Slough (Eureka Slough) is characterized primarily by tidal freshwater habitat with dense stands of riparian vegetation, primarily in the form of willow (*Salix* spp.) and alder (*Alnus* spp.) trees. Brackish water up to 20 parts per thousand occurs during the

summer and fall in the lower portion of this area but further penetration of brackish water is usually blocked by the concrete base of the Humboldt Fish Action Council weir about 5.4 river miles upstream from the bay.

Humboldt Bay is the major waterbody in the action area. It includes a variety of habitats including freshwater marshes, salt marshes, intertidal high and low mud flats, shallow-water bays, and tidal channels. Water in the bay covers about 26.5 square miles at high tide and 7.8 square miles at low ebb tide, the remainder being exposed as shallow tidal flats (Martin O'Connell Associates 1991). Nutrient levels, salinity, temperature, and dissolved oxygen levels are primary factors that cause extreme variability in Humboldt Bay's water quality. Major water quality concerns in the watershed include sedimentation and bacteria-laden runoff, which originate from point and non-point sources. Actual and potential sources of pollution include runoff from pasturelands and rangelands, discharges of treated wastewater by the cities of Eureka and Arcata, exhausts from recreational boats, and accidental discharges of pollutants from ships, commercial boats and recreational boats (Martin O'Connell Associates 1991). The influx of turbid ocean water into the bay, erosion, and sediment transport from disturbed uplands accelerate suspended sediment deposition and turbidity levels.

Eelgrass (Zostera marina) is a perennial aquatic grass that is known to occur in Humboldt Bay and is important habitat for a variety of species and is considered EFH as well as Environmentally Sensitive Habitat Areas (ESHA) according to the California Coastal Act. Surveys were conducted by GHD for ESHA within the action area. During these surveys, no eelgrass or other upland ESHA were found to occur in the action area. .

Good water quality is essential for both salmonids and the invertebrates and other prey on which they feed. Water quality refers to a number of factors, including temperature, turbidity, dissolved oxygen, pH, sediment, suspended material, settleable material, toxicity, pesticides, and chemical constituents. Water quality data for in or near the action area are limited to irregular *in situ* measurements of individual water quality parameters. For example, water temperature, salinity, dissolved oxygen, and pH were all collected for an evaluation of Gannon Slough before and after a tide gate replacement in July 2006 and July 2007 (U.S. Fish and Wildlife Service 2006). Salinity varied daily, generally, between 20 and 35 parts per thousand, pH was between 7 and 8, and water temperatures ranged from 18° to 25°C. High salinity, warm water temperature, and low dissolved oxygen are not uncommon in the tidal portion of Humboldt Bay during the late-summer and fall. Like other Humboldt

Bay tributaries, stream aggradation and sediment input are of concern for the streams occurring in the action area.

Humboldt Bay supports a diverse fish fauna of resident and migratory species. The various types of water column habitat (i.e., open water, deep channels, shallow channels, sloughs and tidal creeks) each support different species and life stages of fish. Over one hundred fish species from 43 taxonomic families use Humboldt Bay for feeding, breeding, and/or as a nursery ground (Fritzsche and Cavanagh 1995; Pinnix et al. 2005). The main factors affecting fish distribution within the estuary are salinity and water temperature. These water quality parameters are influenced by complex relationships between seasonal changes in freshwater flows, ocean tides, channel morphology, land use, and coastal fog climate. Physical conditions are constantly changing due to the dynamic nature of the estuary. Due to salinity gradients, it is possible to catch a freshwater fish and a marine fish at the same site, where freshwater flows on the surface and seawater flows along the bottom (Schlosser and Eicher 2012).

Because the physical conditions in the bay are constantly changing due to the dynamic nature of the estuary, it is difficult to identify the precise fish community occurring in the action area as it likely changes both daily and seasonally with the physical conditions. Several anadromous, freshwater and estuarine species have been identified within and upstream of the action area. These include, but are not limited to, brook lamprey (*Lampetra richardsoni*), threespine stickleback (*Gasterosteus aculeatus*), topsmelt (*Atherinops affinis*), Pacific staghorn sculpin (*Leptocottus armatus*), prickly sculpin (*Cottus asper*), starry flounder (*Platichtys stellatus*), bay pipefish, (*Syngnathus leptorhynchus*), coastal cutthroat (*Oncorhynchus clarki clarki*), steelhead, coho salmon, Chinook salmon, and tidewater goby (UC Davis PISCES Database 2017; Wallace and Allen 2012).

3.3. Summary of Environmental Baseline

Since the 1800s, the physical habitat and habitat forming processes within Humboldt Bay, as well as in the tidally influenced portions of the watersheds, have been altered by human activities associated with land use (agriculture, urban, residential, industrial) and construction and maintenance of transportation corridors (land and marine). Recent and ongoing activities within Humboldt Bay include: (1) annual dredging of the Federal navigation channels and deep water port; (2) construction and maintenance of numerous port-related overwater and hardened shoreline structures; (3) maintenance of agricultural and urban levees and tide gates; and (4) planting and cultivation of approximately 300 acres of oyster aquaculture (National Marine Fisheries Service 2012). In the tidally-influenced lower watersheds, the

physical alteration and disconnection of backwater, side-channel and floodplain habitats and subsequent inaccessibility to juvenile and adult coho salmon, due to passage barriers (culverts, tide gates), have reduced the quantity and quality of the tidal freshwater and estuarine rearing habitat for anadromous salmonids and the tidewater goby.

Numerous factors have been implicated in the decline and ultimate listing of anadromous salmonids inhabiting Humboldt Bay tributaries. These include several human-caused factors, including habitat degradation, harvest, and artificial propagation, that exacerbate the adverse effects of natural environmental variability brought about by drought, floods, and poor-ocean conditions (62 FR 24588). These same stresses also adversely affect Chinook salmon and steelhead and were implicated in the decision to list these species (64 FR 50394 and 65 FR 36074, respectively). Although many of the destructive land use practices that once occurred in the area have ceased, their legacy resulted in an altered sediment supply, impaired water quality, a lack of floodplain and channel structure and altered estuarine function. Photographs of the proposed project area and typical habitats are provided in Appendix B.

Chapter 4. Federally-Listed/Proposed Species and Designated Critical Habitat within Action Area

4.1. SONCC ESU Coho Salmon

On July 19, 1995, NMFS publicly announced its status finding and intent to propose coho salmon as threatened under the federal ESA. Its finding was published in the Federal Register on July 25, 1995 (60 FR 38011) and made final on April 25, 1997. NMFS published its final decision to list coho salmon as threatened under the federal ESA on May 6, 1997 (62 FR 24588). The coho salmon threatened status was reaffirmed August 15, 2011 (76 FR 50447).

SONCC ESU Coho salmon are semelparous salmonids, spending the first half of their life cycle rearing in streams and small freshwater tributaries (Table 2). The remainder of their life cycle is spent foraging in estuarine and marine waters of the Pacific Ocean before returning to their stream of origin to spawn and die. Nearly all SONCC ESU adult coho salmon returning to spawn in the coastal systems along the northern California coast system enter estuaries in December and January, spawn by mid-winter, and then die. Most spawning adults are three-years old; however, some small percentage (5–20 percent) of precocious males known as "jacks" return to spawn as two-year olds (Weitkamp et al. 1995).

Spawning adults can measure more than 2 feet in length and weigh an average of 8 pounds. Eggs incubate in redds (gravel spawning nests) from 1-3 months, depending on the water temperature, before emerging as alevins (larval life stage that depends upon yolk sacs as its food source). Alevins emerge as fry from February to May and initially congregate in shaded backwaters, side channels, or small streams where the stream velocity is lower. As the fry grow, they migrate to habitats with complex cover such as undercut banks, rootwads, large woody debris (LWD) and vegetative overhangs. Instream habitat complexity, including a mixture of pools and riffles, LWD, and well oxygenated cool water (10-15°C/50-59°F) are important habitat components for coho salmon fry (Sandercock 1991; Moyle 2002). The most productive coho salmon nursery habitats tend to be small streams having a larger ratio of slack water to midstream area (Sandercock 1991). Fry typically rear in freshwater for up to 15 months, migrating to the ocean in the spring as smolts. Coho salmon typically spend two growing seasons in the ocean before returning to their natal stream to spawn. In the estuary, smolts often linger for a period, moving up and down with tidal currents, suggesting

that a period of estuarine residence is preferred for adjusting their osmoregulatory system to seawater (Nielson 1994).

Table 2. Typical Life history of SONCC ESU Coho Salmon in North Coast California Streams

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult Migration	■									■	■	■
Spawning	■	■										■
Incubation	■	■	■									■
Rearing (age 0)	■	■	■	■	■	■	■	■	■	■	■	■
Rearing (age 1)	■	■	■									
Outmigration			■	■	■	■			■	■	■	■
Estuarine Rearing*			▒	▒	▒	▒	▒	▒	▒			

Source: (*Wallace and Allen 2007; Wallace et al. 2015; National Marine Fisheries Service 2012); *Informaton on the periodicity of estuarine rearing is limited; however, local monitoring suggests some estuarine residence during spring to summer for Humboldt Bay coho stocks (Wallace and allen 2007).

4.1.1. Survey Results

The brackish-tidally influenced habitat in the action area is unsuitable for SONCC ESU coho salmon spawning. The waterways in the action area are primarily suitable as migratory habitat for adult SONCC ESU coho salmon and as a rearing habitat/emigration corridor for juvenile SONCC ESU coho salmon. High quality, complex freshwater rearing habitat preferred by juvenile SONCC ESU coho salmon for summer rearing is absent in the action area. Additionally, a broad expanse of shallow mudflats, warmer water temperatures, high salinities and seasonally low dissolved oxygen limit the suitability of the action area to a migratory corridor between upstream freshwater spawning and rearing habitats and Humboldt Bay.

Humboldt Bay tributaries support some of the last significant populations of wild SONCC ESU coho salmon remaining in California (Brown et al. 1994). SONCC ESU coho salmon are known to occur in all of the significant Humboldt Bay tributary streams (Wallace 2006). The available data shows that SONCC ESU coho salmon rear in Freshwater Creek (approximately 5.6 river miles upstream of the action area) (Allen et al 2015), and small numbers of SONCC ESU coho salmon rear in Rocky Gulch (up gradient from Brainard's Slough) (Wallace et al. 2015). The peak monthly catch-per-unit-effort (CPUE) for sub-

yearling coho salmon captured in seine nets in Freshwater Creek Slough in 2013-2015, was 4.13 fish/set, 1.08 fish/set, and 6.25 fish/set, respectively. The peak CPUE occurred in October of 2013 and 2014, and July of 2015 (Allen et al. 2016). The peak monthly CPUE for yearling-plus coho salmon captured in seine nets in Freshwater Creek Slough in 2013-2015, was 6.00 fish/set, 6.95 fish/set, and 1.59 fish/set, respectively. The peak CPUE for yearling-plus coho salmon in 2013-2015 occurred in the month of April (Allen et al. 2016).

According to Wallace (2012), juvenile coho salmon likely rear in Rocky Gulch (upstream from Brainard's Slough) throughout the winter; it is hypothesized that the vast majority of this rearing is non-natal. In 2010, one juvenile coho salmon was captured in Rocky Gulch that had been tagged in the Jacoby Creek estuary in 2009 but its natal origin was unknown. This provides further evidence that juvenile coho salmon throughout the Humboldt Bay watershed redistribute themselves, primarily downstream, to over-winter in low gradient habitat in the freshwater-estuary ecotone ringing Humboldt Bay. This "fall redistribution" of coho salmon searching for winter habitat has been observed by other researchers throughout the Pacific Northwest including the Klamath River basin (Lestelle 2007).

4.1.2. Status of Designated Critical Habitat in the Action Area for SONCC Coho Salmon

On May 5, 1999, NMFS announced designation of critical habitat for coho salmon in the Federal Register (64 FR 24049-24062). Designated critical habitat includes all river reaches accessible to listed coho salmon between Cape Blanco, Oregon and Punta Gorda, California. Accessible reaches are those within the historic range of the ESU that can still support any life stage of coho salmon. The waterways in the action area provide some PBFs, but spawning habitat is absent and rearing habitat has limited complex physical structure that is preferred by juvenile coho salmon. PBFs of habitats in the area include features compatible for seasonal estuarine rearing use and migration corridor use by coho salmon.

4.2. California Coastal ESU Chinook Salmon

The California Coastal (CC) Evolutionarily Significant Unit (ESU) Chinook salmon (Chinook salmon) was federally listed as a threatened species on September 16, 1999 (64 FR 50394). Their threatened status was reaffirmed August 15, 2011 (76 FR 50447). The ESU includes all naturally spawned populations of Chinook salmon from rivers and streams south of the Klamath River to and including the Russian River, California (64 FR 50394) as well as hatchery stocks. NMFS determined that these artificially propagated stocks are no more divergent relative to the local natural population(s) than what would be expected between closely related natural populations within the ESU (70 FR 37160).

CC Chinook salmon are fall-run, ocean-type fish that usually enter rivers from August to January. These fall-run Chinook salmon typically enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the main stem or lower tributaries of rivers, and spawn within a few weeks of freshwater entry (Healey 1991). Run timing is, in part, a response to river flow characteristics, with most spawning occurring in November and December. They typically spawn in the lower reaches of rivers and tributaries at elevations of 200–1,000 ft. Juveniles typically begin outmigrating to the ocean shortly after emerging. Freshwater residence, including outmigration, usually ranges from two to four months. After emergence, Chinook salmon fry seek out areas behind fallen trees, back eddies, undercut banks, and other areas of bank cover. As they grow larger, their habitat preferences change (Everest and Chapman 1972). Juveniles move away from stream margins and begin to use deeper water areas with slightly faster water velocities, but continue to use available cover to minimize the risk of predation and reduce energy expenditure.

A common theme in the ESA status determinations for Chinook salmon is the sparseness of spawner abundance data (O'Farrell et al. 2012). There is a lack of adult spawner estimates spanning 3-4 generations for any of the populations, which prevents application of the viability criteria developed for this ESU (Spence et al. 2008). Additionally, the lack of historical population abundance estimates is a major uncertainty. For example, Chinook salmon are periodically observed in many mid-sized watersheds (i.e., Big River, Ten Mile River, Noyo River, Navarro River, Garcia River, and Gualala River) in the region between Cape Mendocino and the Russian River (Spence et al. 2008). However, these watersheds currently do not appear to support persistent populations, and whether they did historically remains uncertain (Bjorkstedt et al. 2005). The paucity of historical evidence may reflect in part the fact that substantial modification of habitats due to logging, splash-damming, and other forestry-related activities had already taken place by the late-1800s (Spence et al. 2008).

4.2.1. Survey Results

The brackish-tidally influenced habitat in the action area is unsuitable for CC ESU Chinook salmon spawning. The waterways in the action area are primarily migratory habitat for adult CC ESU Chinook salmon and migratory and rearing habitat for juveniles. In general, high quality, complex freshwater rearing habitat that is most preferred by juvenile CC ESU Chinook salmon is absent in the action area. The quality of estuarine habitat for migratory CC ESU Chinook salmon in the vicinity of the action area is limited due to the lack of deep water and structurally complex habitats. Additionally, warmer water temperatures, high

salinities and seasonally low dissolved oxygen limit the suitability of the action area to a migratory corridor between upstream spawning and rearing habitats and Humboldt Bay.

Juvenile CC ESU Chinook salmon have been irregularly captured in small numbers in Freshwater Creek, approximately 5.4 river miles upstream of the action area. In 2013, annual weekly seine surveys by CDFW captured only nine juvenile CC ESU Chinook salmon, seven (CPUE of 0.32 fish/set) in May and two (CPUE of 0.08 fish/set) in June (Allen et al. 2016). In 2014, no CC ESU Chinook salmon were captured. In 2015, eight juvenile CC ESU Chinook salmon were captured, three (CPUE of 0.14 fish/set) in April and five (CPUE of 0.23 fish/set) in May.

4.2.2. Status of Designated Critical Habitat in the Action Area for CC ESU Chinook Salmon

Critical habitat for CC ESU Chinook salmon was designated on September 2, 2005. Designated critical habitat in estuaries (e.g. Humboldt Bay) is defined by the perimeter of the water body as displayed on standard 1:24,000 scale topographic maps or the elevation of extreme high water, whichever is greater (70 FR 52537). Portions of the action area are within the elevation of extreme high water and is therefore considered critical habitat. The physical and biological features (PBFs) of critical habitat in the action area are limited to migratory and estuarine rearing habitat.

4.3. Northern California DPS Steelhead

The Northern California (NC) DPS steelhead was federally listed as a threatened species on June 7, 2000 (79 FR 20803). Its threatened status was reaffirmed on April 14, 2014 (71 FR 834). The NC DPS includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in California coastal river basins from Redwood Creek southward to, but not including, the Russian River, as well as two artificial propagation programs: the Yager Creek Hatchery and North Fork Gualala River Hatchery (Gualala River Steelhead Project) steelhead hatchery programs.

Steelhead possess one of the most complex life history patterns of the Pacific salmonid species. Steelhead typically refers to the anadromous form of rainbow trout. Similar to other Pacific salmon, steelhead adults spawn in freshwater and spend a part of their life history at sea. However, unlike Chinook salmon, steelhead exhibit a variety of life history strategies during their freshwater rearing period, and adults may spawn more than once during their life. The typical life history pattern for steelhead is to rear in freshwater streams for two

years, followed by up to two or three years of residency in the marine environment. However, juvenile steelhead may rear in freshwater from one to four years (Moyle 2002).

Steelhead spawn in gravel and small cobble substrates usually associated with riffle and run habitat types. Most young-of-year (YOY) fish prefer riffles, while larger (older) fish move into pools. Cover is extremely important in determining distribution; more cover leads to more fish (Meehan and Bjornn 1991). Preferred water temperatures are 13 to 21 °C (55 –70 °F). Most outmigration is during the spring (January to June), but some outmigration may occur during any significant runoff event.

Land use activities associated with logging, road construction, urban development, mining, agriculture, ranching, and recreation have resulted in the loss, degradation, simplification, and fragmentation of NC DPS steelhead habitat and caused resulting declines in NC DPS steelhead populations (National Marine Fisheries Service 1996). Associated impacts of these activities include: alteration of stream bank and channel morphology, alteration of ambient stream water temperatures, degradation of water quality; elimination of spawning and rearing habitats; fragmentation of available habitats; elimination of downstream recruitment of spawning gravels and LWD; removal of riparian vegetation resulting in increased stream bank erosion; and increased sedimentation input into spawning and rearing areas (National Marine Fisheries Service 1996).

4.3.1. Survey Results

The brackish-tidally influenced habitat in the action area is unsuitable for NC DPS steelhead spawning. The aquatic habitat in the action area is primarily migratory habitat for adult NC DPS steelhead and migratory and rearing habitat/emigration corridor for juvenile NC DPS steelhead. In general, high quality, complex freshwater rearing habitat most preferred by juvenile NC DPS steelhead for summer rearing is absent in the action area. The quality of rearing habitat for NC DPS steelhead in the vicinity of the action area is limited due to a lack of deep water and structurally complex, habitats with overhanging and emergent vegetation. Additionally, warmer water temperatures, high salinities and seasonally low dissolved oxygen limit the suitability of the action area for anything other than a migratory corridor between upstream spawning and rearing habitats and Humboldt Bay.

Juvenile NC DPS steelhead have been regularly captured in small numbers in Freshwater Creek, approximately 5.4 river miles upstream of the action area. In 2013, annual weekly seine surveys by CDFW captured juvenile NC DPS steelhead throughout the year with a peak CPUE of 1.05 fish/set in May (Allen et al. 2016). In 2014, juvenile NC DPS steelhead

were captured throughout the year with a peak CPUE of 0.50 fish/set in October. In 2015, juvenile NC DPS steelhead were again captured throughout the year with a peak CPUE of 0.63 fish/set in June.

Much like the Chinook and coho salmon, steelhead are expected to seasonally occur in small numbers migrating through the action area. Habitat in the action area is predominantly used as transitory migration and rearing habitat for emigrating and rearing juveniles in sloughs.

4.3.2. Status of Designated Critical Habitat in the Action Area for NC DPS Steelhead

Critical habitat for NC steelhead was designated on September 2, 2005. Humboldt Bay and its tributaries in the action area are designated critical habitat. PBFs in the action area are mainly in the form of juvenile rearing habitat and as migration corridors.

4.4. Southern DPS Green Sturgeon

The only known spawning population for the southern DPS green sturgeon is in the Sacramento and Feather Rivers. Based on the distribution of sturgeon eggs, larva, and juveniles in the Sacramento River, green sturgeon spawn in late spring and early summer above Hamilton City, possibly up to Keswick Dam (California Department of Fish and Game 2002). Although these sampling data are limited, it appears that a majority of green sturgeon are spawning above Red Bluff Diversion Dam based on the length and estimated age of post-larvae captured there (aged at approximately 2 weeks old) and at the Glenn-Colusa Irrigation District diversion (aged at approximately 3 weeks old). Three areas upstream of Red Bluff have been documented as key concentrations of green sturgeon spawning activity (Brown 2006; Poytress, et al. 2009).

Throughout the range of the green sturgeon, spawning takes place between April and June in deep, turbulent pools and fast water, when water temperatures range from 46°F to 60°F (Adams et al. 2002). The temporal distribution of egg and larval captures reported by recent studies indicates spawning of green sturgeon occurs from April through July (Poytress et al. 2009). Adult green sturgeon are believed to spawn every 3 to 5 years after reaching sexual maturity, which is believed to be similar to that of the white sturgeon (*A. transmontanus*) at 10 to 15 years of age (CDFG 2002). Adults begin spawning migrations from San Francisco Bay in March, proceeding upstream to Knights Landing during April, and reaching spawning destinations in the Sacramento River from roughly Colusa to above Red Bluff and in the Feather River near Oroville between March and July (Heublein et al. 2006; Seesholtz, et al. 2015). Following reproduction, some adults promptly migrate downstream back to the

estuary and ocean, while others may over-summer and move out of the river during the first fall freshets (Heublein et al. 2006). It appears that adults outmigrate quickly through the middle-Sacramento River (Heublein et al. 2006). Similar behaviors have been observed in the Rogue (Erickson et al. 2002) and Klamath Rivers (Benson et al. 2007).

Juveniles may rear in the river for 1 to 3 years before emigrating downstream to the estuary, primarily during the summer and fall. Existing data suggest that 9- to 10-month-old fish rear in their natal rivers during the winter following hatching moving downstream of the spawning grounds (National Marine Fisheries Service 2009). Few juvenile green sturgeon smaller than approximately 8 inches are observed in samples from the Sacramento-San Joaquin Delta, which suggests that early-aged young likely rear in upstream areas of the Sacramento River. Laboratory studies by Kynard, et al. (2005) indicated that juvenile Klamath River green sturgeon (Northern DPS) migrate and forage downstream of spawning areas at night for the first 6 months of life. As water temperatures decline in the fall and winter to about 46°F, downstream migrational behavior diminishes and more demersal sedentary behavior increases. Once in the estuary, young sturgeon adopt an oceanic foraging habit, which may last between 3 and 13 years before they return for their first spawning season (Moyle 2002).

The primary factor attributed to the listing of southern DPS green sturgeon as threatened was a reduction of available spawning habitat due to blockage by construction of dams and other barriers along the Sacramento and Feather rivers (71 FR 17757). Other threats include, but are not limited to, water diversions and insufficient river flows, altered water temperature regimes, non-native species interactions, legal and illegal harvest, and pesticide and heavy metal contamination of freshwater habitat. Construction of Shasta and Keswick dams on the Sacramento River and Oroville Dam on the Feather River significantly reduced the amount of habitat available to green sturgeon, as well as, to anadromous salmonids. The Biological Review Team posited that habitat blocked by Shasta Dam in the Pit, McCloud, and Little Sacramento rivers may have supported separate meta-populations, but due to a paucity of historical information this idea remains unconfirmed (70 FR 17386). Historically, green sturgeon likely migrated farther upstream to find suitable habitat and water temperatures for spawning. Currently, river temperatures in the Sacramento River downstream of Keswick Dam on the Sacramento River and near the Thermalito Afterbay Outlet, resulting from regulated releases from Central Valley Project and State Water Project reservoirs, respectively, provide suitable conditions for green sturgeon reproduction (71 FR 17757; Seesholtz, et al. 2015).

4.4.1. Survey Results

In general, sub-adult and adult southern DPS green sturgeon may occur in Humboldt Bay seasonally to forage and feed; however, they would not be expected to move into the shallow channels and mudflats within the action area, especially during the low tide in bay work periods. Green sturgeon are regularly caught in small numbers within Humboldt Bay and have been caught in coastal waters and in estuaries from Humboldt Bay to the Oregon border (Adams et al. 2002; Moyle 2002). Acoustical telemetry studies of green sturgeon use in Humboldt Bay suggests that southern DPS green sturgeon activity in the bay is highest from May to August and are present in low numbers (three tagged fish detected utilizing the North Bay in 2007, none in 2006) (Pinnix, 2008, Lindley et al. 2011). Southern DPS green sturgeon do not spawn in the vicinity of the proposed project or in Arcata Bay so no spawning adults would be present. The only known spawning population for the southern DPS green sturgeon is in the Sacramento River. Juvenile green sturgeon rear in fresh water and estuaries for up to four years before migrating to the coastal marine environment. Therefore, no juvenile southern DPS green sturgeon are expected to occur in the action area.

4.4.2. Status of Designated Critical Habitat in the Action Area for Southern DPS Green Sturgeon

On April 7, 2006, NMFS issued its final rule to list green sturgeon that spawn in rivers south of the Eel River (excluding the Eel River), California (the southern DPS) as threatened under FESA (71 FR 17757), effective June 6, 2006. Although spawning populations of the southern DPS green sturgeon do not occur in or north of the Eel River, the species migrates long-distances and occupies bays and estuaries from Monterey, California to Puget Sound. NMFS designated critical habitat for this species on October 9, 2009 (74 FR 52300), and Humboldt Bay is included as a designated estuarine area. Tidal sloughs in the action area are included as part of designated critical habitat for Southern DPS green sturgeon up to the tide gates in Brainard's and Eureka Sloughs.

4.5. Southern DPS Eulachon

The southern DPS eulachon are listed as federally threatened and are a California Species of Special Concern. The southern DPS eulachon populations are thought to consist of spawning runs in the Klamath River, Del Norte County, and in the Mad River and Redwood Creek, Humboldt County. Eulachon spend most of their life in salt water, moving up rivers to spawn in large numbers in the spring. Spawning usually occurs in the lower reaches of rivers or tributaries with pea-sized gravel or semi-sandy areas with woody and other debris (Moyle 2002). The cause of the decline of this species is unknown.

4.5.1. Survey Results

Presence in Humboldt Bay tributaries is noted as rare, but they have been historically been reported (Barnhart et al. 1992). Historically large spawning runs once occurred in the Mad River. Today notable runs are not known to occur in any northern California rivers (Drake et al. 2010).

4.5.2. Status of Designated Critical Habitat

Critical habitat for the Southern DPS eulachon was designated on October 20, 2011, with an effective date of December 19, 2011. The critical habitat unit closest to the action area is several miles north, along the Mad River which is not a tributary to Humboldt Bay.

Chapter 5. Effects of the Project on the Action Area

5.1. Proposed Project Activities

A complete description for the proposed project is described in detail in Chapter 1. Key project components and activities potentially affecting the listed fish species and designated critical habitat that are analyzed in this chapter are as follows:

Construction of the Humboldt Bay Trail South project would include the following activities:

- Clearing and Grubbing to clear trees, vegetation and topsoil from the proposed trail footprint.
- Excavation mainly at bridge approaches with other shallow excavations to maintain trail grades.
- Embankment – Fill to maintain trail grades through low areas.
- Aggregate Base – For trail shoulders and to support asphalt paving.
- Asphaltic Concrete Paving – For trail surface.
- Fencing/Gates – To meet ADA requirements.

Construction for assembly and placement of pre-manufactured bridges at Brainard's Slough and at the north and south crossings to access the CRC levee would include the following activities:

- Excavation – For the abutment foundations (maximum depth of six feet below existing grade) – common to all bridges.
- Aggregate Base – For structure foundations – common to all bridges.
- Abutments and Footings – Either pre-manufactured or cast-in-place concrete to support pre-manufactured bridges – common to all bridges.
- Piles –Reinforced concrete in steel shell to support pre-manufactured bridges – common to all bridge abutments and for piers to support three bridge spans for the north crossing at the CRC levee.
- Placement/Installation – Set pre-manufactured bridge on abutments and piers.
- Installation/Removal of temporary sheet piles to retain gravel work pads and a water bladder cofferdam on the mudflat for temporarily isolating the construction area for the north crossing at the CRC levee.

5.1.1. Sequencing and Schedule

Construction is expected to begin in late spring and require approximately six months to complete the project. Anticipated daytime work hours are 7:00 a.m. to 7:00 p.m., Monday through Friday with occasional work on Saturdays. Construction on Sundays and legal holidays is not currently anticipated except in emergencies or with prior approval from the County. The proposed coffer dam at the CRC north bridge crossing would be constructed in a way to minimize the potential for stranding aquatic organisms. Construction will take approximately 2 days, and would be completed only during daily low tide cycles. Any remaining pooled water within the coffered area will be surveyed by a biologist and any aquatic organisms present would be relocated to the bay waters outside of the coffer dam.

5.1.2. Project Operation and Maintenance

The proposed trail would be used for non-motorized transportation and recreation, including but not limited to walking, bicycling, running, dog-walking, skateboarding, roller skating and equestrians. Dogs would be allowed on leash only. Following construction, general operation and maintenance activities associated with the proposed trail would presumably remain the responsibility of the County, the City of Eureka, and/or Caltrans, and include annual inspections, cleaning, repaving, painting, and repairs as needed. Operation and maintenance of the proposed trail would generate less than one vehicle trip per week on average. Motorized access would be limited to light maintenance and emergency service vehicles. Access would be gained at trail/roadway crossings equipped with secured, but removable bollards to prevent unintended vehicular access.

5.2. Stressors From Proposed Project Activities

The proposed action includes a number of construction activities that have a potential to adversely affect, via various stressors resulting from these activities, the federally listed fishes that may occur in the action area.

Stressors for aquatic species that may potentially occur as a result of project activities include:

- Increased turbidity and suspended sediment caused by in-channel and onshore excavation and carried by surface runoff to waterways through disturbed soils at construction sites.
- Exposure to water pollutants and exposure to hazardous materials that may occur as a result of accidental spills of lubricants and fuels from construction sites.

- Physical alteration to local habitat –changes in bed topography, alteration of bed and bank substrates, removal of vegetation, temporary isolation of tidal mudflat in work area near the CRC levee using a water bladder coffer dam, installation of bridge piles and abutments for trail bridges and appurtenant retaining wall structures.
- Hydroacoustic barotraumas caused by pile driving near the water for bridge foundations and piers and for installation of temporary and permanent sheet piles.

5.3. Exposure Pathways to Stressors from the Proposed Action

When determining the likelihood of exposure of an organism to a particular stressor, the potential of the organism to be present in the action area must be determined. This section presents the approach and analysis used to determine the potential for occurrence of federally listed fish species in the action area during the proposed trail construction activities, informing the likelihood of exposure to potential stressors resulting from the proposed action. The focus of the analysis was to determine the seasonal timing and relative abundance of the freshwater life-stages of salmonids in the vicinity of the action area.

5.3.1. Potential for SONCC ESU Coho Salmon to Occur Within the Action Area

The action area does not contain suitable salmon spawning habitat, but does provide migratory corridors between Humboldt Bay and the freshwater spawning habitat in upstream watershed tributaries. Adult SONCC ESU coho salmon may migrate through Brainard's and Eureka sloughs to ascend the watershed streams flowing into them to spawn. Timing of the spawning runs varies slightly among years, and is highly dependent on rain events. The coho salmon spawning migration is typically initiated as early-fall rain events increase discharge into Humboldt Bay. It is anticipated that no adult SONCC ESU coho salmon will be migrating through the action area during the construction at Brainard's Slough because the proposed construction work window (July 1 –September 31) would end prior to typical early-fall rain events.

Because Eureka Slough and Brainard's Slough in the action area may serve as migratory corridors between upstream freshwater salmon spawning and rearing habitat and as transient rearing habitat for juvenile salmon during their emigration from upstream rearing areas to the marine environment, juvenile SONCC ESU coho salmon may occur seasonally in the action area. However, the probability of this species occurring in the action area is very small given the proposed July 1 – September 31 in bay or in channel work window. Summer rearing of SONCC ESU coho salmon in Humboldt Bay tributaries occurs almost exclusively in the

freshwater portion of the stream-estuary ecotone (Wallace et al. 2015), which is upstream of the action area. Therefore, it is not anticipated that estuary rearing summer SONCC ESU coho salmon will be present in the action area during summer due to the brackish, tidally influenced habitat and lack of deep channel structure in the action area.

Studies of the life history of juvenile SONCC ESU coho salmon in Freshwater Creek by Wallace et al. (2015), provides evidence that juvenile coho salmon do not migrate from the stream-estuary ecotone to Humboldt Bay, through the action area, during summer months (Figure 4). All proposed work activities in the vicinity of Eureka Slough would be confined to the existing railroad bridge and would not require any in-channel construction activity, except for use of small boats or a small barge for suspension of netting to catch any falling debris during construction before it enters the waterway. So, the season timing and confinement to the existing bridge of proposed trail construction activities is expected to avoid or minimize any potential for direct effects to migrating and rearing juvenile SONCC ESU coho salmon in Brainard's Slough and Eureka Slough.

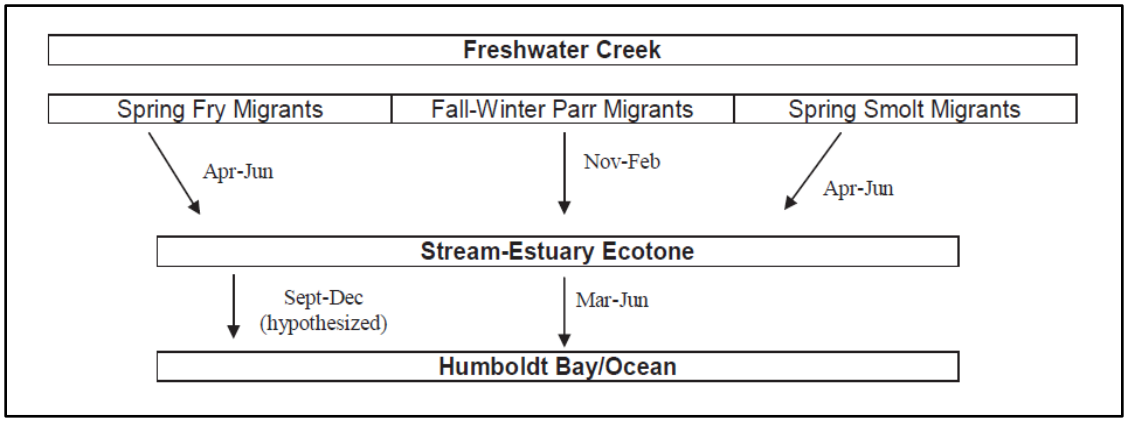


Figure 4. Diagram of juvenile coho salmon life history pattern in Freshwater Creek watershed, Humboldt, California from Wallace et al. (2015).

Non-natal rearing of SONCC ESU coho salmon in Rocky Gulch (above Brainard's Slough) is also highly seasonal. According to Wallace et al. (2015), no juvenile SONCC ESU coho salmon were observed in Rocky Gulch during the summer months in 2007-2010 (Table 3). Proposed trail construction activities at the Brainard's Slough/Rocky Gulch trail bridge crossing, including the use of vibratory and impact pile driving to proof the last five feet of piles, would involve in-channel work; however, the proposed seasonal work window and restricting in-channel construction activities to daily low-tide periods, would avoid direct effects to juvenile SONCC ESU coho salmon.

In summary, adult SONCC ESU coho salmon would not be present in the action area during the proposed instream work window (July 1 –September 31). Juvenile SONCC ESU coho salmon are documented to occur and migrate seasonally through the action area, mainly during the winter and spring months. Evidence of the local life history patterns of coho salmon and habitat conditions within the action area suggests a low likelihood that juvenile coho salmon would be present during the proposed in-channel work window (i.e., restricting in-channel construction activities to the summer months and to daily low tide periods).

Table 3. Number of YOY and Age 1+ Coho Salmon Captured in Wood Creek, Martin Slough, and Rocky Gulch, Humboldt County, California, by Season, 2007-2010[a].

	Wood Creek		Martin Slough		Rocky Gulch		Combined	
Season	1+	YOY	1+	YOY	1+	YOY	1+	YOY
Winter 2007	86	0	4	0	68	0	158	0
Spring 2007	27	2	71	0	33	1	131	3
Summer 2007	1	16	0	17	0	0	1	33
Fall 2007	0	17	0	24	0	1	0	42
Winter 2008	125	0	68	0	20	0	213	0
Spring 2008	50	0	70	0	16	0	136	0
Summer 2008	0	1	0	13	0	0	0	14
Fall 2008	1	4	0	37	0	0	1	41
Winter 2009	46	0	435	0	28	0	509	0
Spring 2009	19	3	246	1	3	0	268	4
Summer 2009	1	3	17	31	0	0	18	34
Fall 2009	1	3	8	8	0	1	9	12
Winter 2010	140	0	198	0	76	0	414	0
Spring 2010	19	3	83	0	38	0	140	3

[a] Winter is January to March, spring is April to June, summer is July to September, and Fall is October to December from Wallace et al (2015).

5.3.2. Potential for California Coastal ESU Chinook Salmon to Occur Within the Action Area

The spawning run timing for CC ESU Chinook salmon varies slightly among years, and is highly dependent on fall rain events. The spawning run is typically initiated as early-fall rain events increase discharge into Humboldt Bay. Because the in-water work window (July 1 – September 31) would end prior to typical early-fall rain events, it is anticipated that no adult CC ESU Chinook salmon will occur and migrate through the action area during the in-channel construction activities.

Eureka Slough provides a migratory corridor and transient rearing habitat for emigrating juvenile Chinook salmon (Wallace et al. 2015); however, the probability of CC ESU Chinook salmon occurring in the action area during the restricted seasonal construction

window is very small because juveniles exhibit an ocean-type life history and emigrate between the upstream freshwater rearing habitat and Humboldt Bay during the winter through late-spring months. By restricting all work activities during the summer months, the potential for direct effects to rearing CC ESU Chinook salmon will be avoided or minimized.

In summary, adult CC ESU Chinook salmon are not anticipated to be present during the proposed seasonally restricted instream work window, July 1 –September 31. And, while juvenile CC ESU Chinook salmon are documented to occur near the action area, recent abundances have been very low and juveniles emigrate from area streams in the action area to the marine environment before the proposed seasonal in-channel construction period (July 1 – September 31).

5.3.3. Potential for Northern California DPS Steelhead to to Occur Within the Action Area

Adult NC DPS steelhead run timing varies among years, and is highly dependent on rain events. The spawning runs typically begin in late-fall and spawning typically begins in January. It is anticipated that no adult NC DPS steelhead will be migrating through the action area during the instream construction because the proposed in-water construction work window (July 1 –September 31) would end prior to typical early-fall rain events.

Eureka Slough serves as a migratory corridor and transient rearing habitat for juvenile steelhead emigrating between upstream freshwater rearing habitat and Humboldt Bay. The probability for juvenile NC DPS steelhead to occur in the action area during the restricted seasonal construction window is very small because juveniles typically emigrate between the upstream freshwater rearing habitat and Humboldt Bay during the late-fall, winter, and spring months (Wallace et al. 2015). By conducting all proposed in-bay and in-channel work activities during the mid-to late-summer months and daily low tides, the potential for direct effects to rearing NC DPS steelhead will be very low because they occur only during the late-fall, winter, and spring as emigrating juveniles, during significant run-off events.

In summary, adult NC DPS steelhead are not anticipated to be present during the proposed seasonally restricted instream work window, July 1- September 31. And, while juvenile NC DPS steelhead are documented to occur near the action area, numbers have been very low, and it is anticipated that most juveniles emigrate from area streams in the action area to the marine environment before the proposed seasonal in-channel construction period (July 1 – September 31). Therefore, with all in-channel and in-bay construction limited to July 1 –

September 31 during low tides, no steelhead are anticipated to be present within the action area.

5.3.4. Potential for Southern DPS Green Sturgeon and Eulachon to Occur in the Action Area

As described in Sections 4.4 and 4.5, the potential for occurrences of green sturgeon and eulachon in the action area during daily low tides is unlikely. Historically, eulachon may have occurred in portions of Humboldt Bay but, presently, notable runs do not occur in Northern California (Drake et al. 2010).

The southern DPS green sturgeon may foray into Humboldt Bay to feed during their maritime life phase but are known only to spawn in the Sacramento River. Adults have previously been detected in very low numbers within Arcata Bay. Juvenile green sturgeon rear in freshwater and estuaries for up to four years before migrating to a coastal marine environment. Therefore, no juvenile green sturgeon would be found in the action area and any potential use would be limited to sub-adults or adults for foraging, likely during high tides and only in the deeper channels of the bay. Presence of southern DPS green sturgeon would not be anticipated near the action area during the limited work window due to the shallow water and strong tidal influences in Humboldt Bay.

5.4. Responses to and Effect of Stressors from Proposed Project Actions

Potential stressors resulting from the proposed action construction activities and the associated responses of listed species to these stressors and the likely effects on federally listed fish species that may occur in the action area are discussed in this section and are summarized in Table 4 below.

Table 4. Project-Related Activities, Stressors, Responses, and the Exposure Potential for Listed Fish Species and Their Habitat Occurring in the Humboldt Bay South Project Action Area

Stressor			Response	Exposure Potential[1]	
Project Activity	**Effect**	**Frequency/ Duration**	**Response to Stressor**	**Probability of Effect[2]**	**Magnitude of Effect[3]**
Construction of new bridges and supports	Increased turbidity and suspended sediment	Hours	In order of increasing magnitude and duration of the stressor: altered feeding behavior and efficiency; displacement and increased predation risk; reduced growth rates; increased plasma cortisol levels, reduced respiratory function, reduced disease tolerance, and mortality.	Low. Cleared and graded soils could be mobilized during rainfall and flow events in the few years following construction; however, the proposed action includes measures to control erosion and revegetation to minimize the erosion potential.	Very low. Any incremental effects from suspended sediment and turbidity during a storm event would be insignificant compared to background levels with implementation of conservation measures.
	Hazardous materials exposure - Accidental spill of lubricants and fuels[4]	Minutes/hours	Immobilization and impaired locomotion, reduced growth, reduced reproduction, genetic damage, tumors and lesions, developmental abnormalities, behavior changes (avoidance), and impairment of olfactory and brain functions.	Very low. Implementation of Conservation Measure 2will reduce the likelihood of spills. Basin for any drilling fluids or other will be pumped away from the water decreasing risk of fluid spill	Negligible. Extremely unlikely to occur. Low probability coupled with Conservation Measures 6-9 would minimize but not eliminate potential.
	Barotraumas	Hours	Variable depending on the duration, frequency in hertz, and pressure in decibels. Eggs and embryos are the most vulnerable. Percussion shock waves may damage the sensory cells of fish if sustained high-intensity exposures occur, mortality at extreme intensities and pressures.	Low. The likelihood of barotraumas to occur is reduced with the use of a vibratory hammer except for proofing the last five feet and will be occurring during low tide, out of water.	Very low to low, the effects would be insignificant (in size) or discountable (extremely unlikely) to occur. If they are in the area effects would be limited to behavioral impacts.

Stressor			Response	Exposure Potential[1]	
Project Activity	**Effect**	**Frequency/ Duration**	**Response to Stressor**	**Probability of Effect[2]**	**Magnitude of Effect[3]**
	Change in local habitat with the loss of overhead cover, shading, and organic inputs	Years	Loss of natural cover (increased predation); increased water temperature (effects thermal regulation)	Very low. Impacts would not result in measurable increases to water temperature or a significant loss of wood recruitment potential. Riparian areas would be replanted with similar vegetation types.	Very low. Any temporary reduction in overhead cover, shading, or organic input would be insignificant in size relative to surrounding habitat conditions.
	Increased turbidity and suspended sediment	Hours	In order of increasing magnitude and duration of the stressor: altered feeding behavior and efficiency; displacement and increased predation risk; reduced growth rates; increased plasma cortisol levels, reduced respiratory function, reduced disease tolerance, and mortality.	Very low. Cleared and graded soils could be mobilized during rainfall and flow events in the few years following construction; however, action includes measures to control erosion and revegetate to minimize the potential for erosion.	Very low. Any incremental effects from suspended sediment and turbidity during a storm event would be insignificant compared to background levels with implementation of conservation measures.
Localized removal of or damage to habitat for construction of trail and prism	Physical changes to local bank and substrate habitat	Days/years	Increased predation risk due to loss of natural cover. Displacement and competition for suitable cover, decreased invertebrate production and feeding efficiency.	Very low. Adverse modification of habitat extremely unlikely to occur. Locations impacted will be contoured and revegetated to mimic surrounding habitat. The new bridge pier would be similar to the existing pier and would not create an overall loss of substrate habitat.	Very low. Any localized temporary loss of cover would be insignificant in size relative to available habitat present.

Stressor			Response	Exposure Potential[1]	
Project Activity	**Effect**	**Frequency/ Duration**	**Response to Stressor**	**Probability of Effect[2]**	**Magnitude of Effect[3]**
	Increased turbidity and suspended sediment	Hours/variable	Siltation of streambed substrates downstream, decreased invertebrate production, decreased habitat quality.	Very Low. Soils could be mobilized during rainfall and flow events in the few years following construction; however, action includes measures to control erosion and revegetation to minimize the potential for erosion to occur.	Very low. Any incremental effects from suspended sediment and turbidity during a storm event would be insignificant compared to background levels with implementation of conservation measures.

Notes:

[1] Exposure potential includes consideration of the implementation of Conservation Measures and BMPs that are incorporated as part of the proposed action.

[2] Probability that the proposed action will result in take of listed species or in the adverse modification of PCEs of critical habitat and EFH. No effect=no potential to affect fish or habitat; Very low=take or adverse modification of habitat extremely unlikely to occur (insignificant or discountable); Low=potential for take or adverse modification of habitat is small, but is not insignificant or discountable; Moderate=reasonable likelihood the proposed action would result in the take of listed species and/or in the adverse modification of critical habitat and EFH; High=proposed action would result in the certain and unavoidable take of listed species and/or in the adverse modification of critical habitat and EFH.

[3] Magnitude of effect based on the environmental baseline with implementation of avoidance and minimization measures as part of the proposed action. No effect=no potential to affect fish or habitat ; Very low=effects would be insignificant (in size) or discountable (extremely unlikely) to occur; Low= small, but unknown number of individuals subject to take or minor short-term or temporary effects to elements of critical habitat and EFH; Moderate: 10's of individual fish or measurable temporary or localized impacts to elements of critical habitat/EFH; High=hundreds or thousands of individual fish or long-term or permanent adverse impacts to elements of critical habitat and EFH.

[4] All construction-related activities requiring the use of machinery could result in the spill of lubricants and fuels.

5.4.1. Increased Turbidity and Fine Sediment

Increases in suspended sediment or turbidity can affect water quality and in turn can affect fish health and behavior. Suspended solids and turbidity generally do not acutely affect aquatic organisms unless they reach extremely high levels (i.e., levels of suspended solids reaching 25 mg/L). At these high levels, suspended solids can adversely affect the physiology and behavior of aquatic organisms and may suppress photosynthetic activity at the base of food webs, affecting aquatic organisms either directly or indirectly (Alabaster and Lloyd 1980). It has been found in research on exposure that length of exposure to total suspended solids (TSS) plays a more dominant role than TSS concentration (Anderson et al. 1996). Long-term exposure to elevated TSS conditions may cause endocrine stress responses (elevated plasma cortisol, glucose, and hematocrits), suggesting an increased physiological burden that could influence growth, fecundity and longevity (Lloyd 1987; Redding et al. 1987; Servizi and Martens 1992).

In considering the effects of TSS on listed fish, it is important to consider the frequency and the duration of the exposure, not just the TSS concentration (Newcombe and Jensen 1996). Adverse effects can become more pronounced with increased TSS concentrations and longer exposure durations in aquatic systems where elevated TSS conditions occur infrequently. In general, elevated TSS or turbid conditions can influence fish in the following ways:

(1) Behavioral effects: avoidance (holding or migration changes), attraction (TSS as cover; (reduced predation risk), reduced feeding success, increased “coughing” or “gill flaring”;

(2) Physical effects: stress, tissue damage, reduced growth, mortality; and

(3) Habitat effects: increased sedimentation, fill gravel interstitial spaces, decrease intergravel dissolved oxygen concentrations, decrease residual pool volumes, decrease spawning and emergence success.

Effects to salmonids are categorized as:

- Sub-lethal - Reduction in feeding rate or success, coughing and increased respiration, moderate habitat degradation, and impaired homing.
- Lethal - Reduced growth, increased predation, and mortality (Newcombe and Jensen 1996).

The proposed action would not be expected to result in significant increases of suspended solids and turbidity to levels causing acute, lethal effects on aquatic organisms or adverse effects on designated critical habitat for federally listed fish species because all in-channel construction would occur during low tide periods and erosion and sediment runoff controls would be used. Temporary and localized increases in turbidity may occur during construction of the bridge crossings when flood tides inundate in-channel work areas. These potential increases would be very short-lived and within the natural range of turbidities in Humboldt Bay.

The primary basis for this assessment relies on a study of dredging activities within Humboldt Bay that found that overflow turbidity plumes typically subsided within 15-60 minutes (U.S. Army Corps of Engineers, 2012). Dredging causes a much greater degree of sediment suspension and turbidity than would the proposed action construction activities. Due to the unconsolidated substrate conditions within Arcata Bay at the CRC bridge crossings, there would likely be localized increases in turbidity near the work zone during installation and removal of construction support structures. Based on substrate and water conditions in the area, a conservative estimate is that increased turbidity levels would not extend more than 200 feet from the location of the bridge structures. This is based on the estimated 15-60 minute decay rate of any turbidity plume. Repetitive inundation from tidal fluctuation and wind and wave action in the bay often creates turbid conditions; therefore, it is anticipated that any increase in turbidity as a result of the proposed action would be low relative to natural background levels. With implementation of Conservation Measures to control erosion and sediment runoff from construction sites and in consideration of natural background levels of suspended sediment and turbidity, impacts on designated critical habitat for listed fish species due to increases sediment and turbidity as a result of the proposed project would be minor and insignificant.

5.4.2. Hazardous Materials Exposure

Oils and similar substances from construction equipment can contain a wide variety of polynuclear aromatic hydrocarbons (PAHs) and metals. Both can result in adverse impacts to salmonids. PAHs can alter salmonid egg hatching rates and reduce egg survival as well as harm the benthic organisms that are a salmonid food source (Eisler 2000). Some of the effects that metals can have on salmonids are: immobilization and impaired locomotion, reduced growth, reduced reproduction, genetic damage, tumors and lesions, developmental abnormalities, behavior changes (avoidance), and impairment of olfactory and brain functions (Eisler 2000). Operation of construction equipment in or adjacent to nearby waterways could result in the spill of hazardous materials (i.e., oil, grease, and gasoline,

solvent). Construction activities include the refueling of construction equipment on location. As a result, minor fuel and oil spills could occur, and there would be a risk of larger releases. Without rapid containment and clean up, these materials could be toxic, depending on the location of the spill, the materials and volume released, proximity of water, and life stages present. Such spills could have deleterious effects on all life stages of salmonids present in close proximity to construction activities.

The potential for exposure of federally listed fish species known to occur in the action area would be very low because proposed construction activities and use of equipment in and near waterways would be restricted to the summer dry season (July 1 – September 31), when occurrence in the action area of any of the federally listed fishes would be discountable. Additionally, the proposed action would include Conservation Measures to minimize the potential for leaks and spills of hazardous materials, as well as implementation of emergency spill control and response plans, and work would be completed out of water. Therefore, the potential for localized impacts to listed fish species and their designated critical habitat resulting from the spill of hazardous materials is considered to be discountable.

5.4.3. Physical Alteration of Aquatic Habitat

5.4.3.1. ESTUARINE

The estuarine habitat and sloughs of Humboldt Bay have been shown to be important for juvenile salmonid rearing (Wallace et al. 2015). However, the tidal sloughs and estuarine habitats in the action area lack woody riparian vegetation and other physical structure, such as deeper channels adjacent to vegetated emergent saltmarsh that are preferred by estuarine rearing salmonids.

Construction of the bridge at the CRC levee access crossing in Arcata Bay would result in a small loss of approximately 18 square feet of unconsolidated substrate (mudflat) habitat in the estuary as a result of pile placement in the bay. This small loss would be insignificant compared to the total area of mudflat habitat in the vicinity. Construction of the trail bridges could also result in indirect effects to salmonids through the disturbance of the substrate that could cause a short term increase in turbidity and suspended sediment during construction activities. Indirect effects of suspended sediment and turbidity would be similar to those described, previously except they would occur later in time.

Temporary impacts to local habitat will also occur during construction of the north CRC boardwalk. A temporary cofferdam will be constructed preventing access to an estimated 0.3 acre of intertidal mudflat habitat. This could indirectly affect special-status species through a small reduction in available prey items. However, the area to be temporarily isolated by the

coffer dam is relatively small compared to the total available intertidal mudflat area of Humboldt Bay and is not adjacent to deeper tidal channel habitats or eel grass beds typically preferred by rearing salmonids and other fishes. Additionally, the proposed construction on the mudflats (estuarine habitat) would be restricted to July 1 – September 31 and would occur out of water (using an isolating coffer dam and scheduling in-channel work during low tides). Therefore, the probability of listed anadromous salmonids occurring in the action area would be discountable.

Estuarine - Intertidal Rocky Shore

Impacts to rocky intertidal habitat includes an estimated 500 lineal feet of rip-rap to be placed for shoreline revetment keyed into the ground with new ballast along the North Eucalyptus area (Segment 7). This section would be 15 feet wide (in plan view), totaling 7,500 square feet. Of this total, 20% (1,500 square feet) will be placed above 9.2 feet mean sea level (msl) (above Federal and State waters). Of the 80% remaining placed below 9.2 feet msl, 90% (a total of 5,400 square feet) of that would be placed on existing rip rap rock mapped as Estuarine Rocky Intertidal Shore; therefore, no mitigation is proposed. Three hundred square feet (0.007 acre) of this rip-rap will be placed in *Estuarine Intertidal Emergent Wetlands – Native*, and 300 square feet (0.007 acre) will be placed in *Estuarine Intertidal Unconsolidated Bottom* wetland, both of which will require mitigation. The area to be rip-rapped already consists of rocky rip-rap shoreline that will be rehabilitated to repair existing shoreline erosion and prevent future erosion. Therefore, no long term significant alteration of rocky intertidal shore habitat or significant increase in rip-rapped shoreline is anticipated.

Based on the existing habitat conditions in the action area and the probable magnitude of project-related disturbance of aquatic habitat, the effects of the proposed action on designated critical habitat for federally listed salmonids would be insignificant with implementation of conservation measures. The proposed project would also not permanently or significantly reduce the extent or function of estuarine habitats in the action area.

5.4.4. Pile-driving Barotraumas

In instances where piles are driven in aquatic environments, there is a potential for barotraumas (i.e., injuries sustained in response to the sudden pressure change due to compression waves travelling underwater). The effect of pile driving on free swimming fish depends on the duration, frequency in hertz (Hz), and pressure in decibels (dB) of the generated pressure wave. The potential effects are greatest for salmonid embryos, which are very sensitive to pressure waves following fertilization until the eyed-stage of development

(Piper et al. 1982); however, no spawning of listed fishes is known to occur in the immediate action area. Pressure waves may damage the sensory cells of juvenile fish if sustained high-intensity exposures occur.

To minimize potential hydroacoustic impacts to listed fishes, all piles would be installed almost entirely with a vibratory hammer. However, piles would likely require the last few feet to be proofed with an impact hammer as described in the project description. Vibratory pile-driving is generally 10-20 dB lower in sound energy than impact hammers, but even low-frequency sounds have been found to illicit behavior responses in salmonids (Caltrans 2015). Juvenile salmonids, when startled, can be harmed by temporarily disrupting normal behaviors that are essential to growth and survival such as feeding, sheltering, and migrating. Adverse effects may occur when disruption of normal behaviors increases the likelihood that individual fish will face increased competition for food and space and experience reduced growth rates or possibly weight loss. Disruption of normal behaviors may also result in the death of some individuals due to increased predation if fish are disoriented or concentrated in areas with high predator densities.

Between July 1 and September 31, piles will be driven with a vibratory hammer and proofed with an impact hammer to provide bridge supports at Brainard's Slough and the CRC locations. These piles will be driven to a depth of approximately 100 feet. The piles, in all cases, would likely need to be proofed by driving up to the final 5 feet with a conventional pile driver to achieve design tip elevation and verify load capacity. The potential of acoustic effects on fish from pile driving for the proposed action was approximated using measurements of similar piles driven under the most similar conditions as provided in Caltrans' 2015 hydroacoustic data compendium (Caltrans 2015).

As of August, 2017 there has been no formal agreement on specific fish injury threshold criteria that should be applied to vibratory pile driving. However the hydroacoustic compendium suggests that a 220 dB threshold for accumulated sound exposure level (SEL) is a reasonable starting point. The ultimate threshold agreed upon may be between 187 and 220 dB (Table 5).

Table 5. Acoustic Thresholds for Pile-Driving

Type	Peak Pressure [dB (re: 1µPa)]	Physical Effects		Behavioral Effects Root Mean Square (RMS) Pressure [dB (re: 1µPa)]
		Cumulative Sound Exposure Level (SEL)[a] dB (re: 1µPa[†]·Sec)		
		Fish ≥ 2 grams	Fish < 2 grams	
NMFS Threshold for Standard Hammer	206	187	183	150
NMFS Threshold for Vibratory Hammer[a]	N/A	187-220	187-220	150

[a] There is no formal agreement on criteria to be applied to vibratory pile driving. The ultimate threshold for SEL will likely be between 187 and 220 dB for peak pressure (Caltrans 2015)

Two different representative scenarios were selected as input for NMFS' hydroacoustic calculator to determine potential areas of hydroacoustic impacts for the proposed pile driving activities (Table 6). For the north and south CRC mudflat crossings, data for pile driving at the Petaluma Bridge in Napa County was used for inputs into the NMFS Pile Driving Calculations model. This example was chosen because substrate and the fluctuating tidal environment were comparable to the proposed project's sites. The Petaluma Bridge scenario differed from the proposed piles for the CRC sites in the use of steel H piles versus the CISS piles that will be used at the CRC sites; however, CISS and steel H piles of similar size generally exhibit similar acoustic levels (Caltrans 2015). Data from the Petaluma Bridge were for piles driven into intertidal substrate, while dry, during low tides. It is important to note that piles were much closer to the tidal water's edge (noise levels measured at 53 feet) in the Petaluma Bridge example than would be the piles driven at the proposed CRC sites. Furthermore, restriction of in-bay work during daily low tides under the proposed project makes the Petaluma Bridge example a worst-case scenario. During low tides, when the piles will be driven, the tidal waters in Humboldt Bay can be 1,000 feet away or more from the proposed CRC bridges. Additionally, for the CRC south location, piles will be driven within the levees, not in the bay mudflats as would be required for a portion of the northern bridge location. Therefore, through-ground attenuation of acoustic energy would be even greater at the CRC south bridge construction site since it would be farther away from the water's edge at low tide and would travel through less saturated sediments.

For the Brainard's Slough location, the representative data for the NMFS Pile Driving Calculations model is from piles driven along the bank adjacent to the Sacramento River in Shasta County (Table 6). This example was selected because pile types and environmental

conditions were comparable to the proposed project's site. It is important to note that CISS piles were driven adjacent to the main channel, partially on dry bank and partially in up to a few inches of water. During pile driving at Brainard's Slough, it is estimated that the water's edge of the slough channel will be 20-30 feet away, making the source data example also a worst-case scenario for the proposed project.

Table 6. Representative Pile-Driving Data Used for Estimating Acoustic Effects for the Humboldt Bay Trail South Project

Proposed Project Site	Caltrans (2015) Data Source	Pile type	Location	Driver Type	Habitat	Distance Pile to Measure-ment	Water Depth	Peak dB	RMS dB	SEL dB
CRC Bridge Crossings	Table I.-2-3 pg. 1	Steel H Pile	Petaluma River Napa County	Impact Hammer	Tidal mudflat	52 feet (16 meters)	4 - 6.5 feet (1.2 - 2 meters)	157	146	136
Brainard's Slough	Table I.3-24 page I-43	24-inch Steel Shell	Sacramento River Shasta County	Vibratory then Impact Hammer (Impact hammer values shown)	River Bank (partially dry*)	33 feet (10 meters)	3 feet (1 meter)	175	148	NA (148 used for analysis)

* Pile was located on shoreline partially on dry ground and partially in water 3 to 4 inches deep.

Table 7. Pile Driving and Potential Acoustic Impact Information for the Humboldt Bay South Project

Proposed Project Site	Driver type	Pile type	Pile size		Number of piles installed per day	Estimated maximum number of impact strikes per pile	Estimated total number of days piles will be driven	Estimated total strikes per day	NMFS Calculator Estimated acoustic distance to Thresholds[a]			
			Diameter (inches)	Maximum number/ Length					Peak (206 dB)	Cumulative SEL		Behavior RMS (150 dB)
										Fish ≥ 2 g (187 dB)	Fish < 2 g (183 dB)	
Brainard's slough	Vibratory then drop hammer to proof last 5 feet	CISS	18	10 piles to100-foot depth below grade	3-4 piles	100	2-3	400	0	3 feet (1 meter)	9.8 feet (3 meters)	23 feet (7 meters)
CRC North	Vibratory then drop hammer to proof last 5 feet	CISS	18	20 piles to100-foot depth below grade	3-4 piles	100	5-7	400	0	0 feet (0 meters)	3 feet (1 meter)	29.5 feet (9 meters)
CRC South	Vibratory then drop hammer to proof last 5 feet	CISS	18	8 piles to100-foot depth below grade	3-4 piles	100	2-3	400	0	0 feet (0 meters)	3 feet (1 meter)	29.5 feet (9 meters)

[a] Input used for the NMFS calculator were obtained from Caltrans (2015) Technical guidance for assessment and mitigation of the hydroacoustic effects of pile driving on fish, and shown in Table 6.

Using the data from the two example scenarios and the maximum estimate of up to a total of 400 strikes per day for input in the NMFS Pile Driving Calculations model, acoustic energy is not likely to rise to the physical injury threshold of 187 dB_{SEL}, even within 3-feet (1 meter) of piles being driven with an impact hammer (see Tables 6 and 7). The data in these tables suggest that a behavioral impact radius of 29.5 feet (9 meters) could occur when pile driving, based on criteria for similar piles driven at water's edge for a comparable project (see calculation sheets in Appendix C). However, it is reasonable to expect that this behavioral impact radius would not extend even this distance from piles for the proposed action at Brainard's Slough and the CRC bridge sites, because all piles will be driven during low tide cycles, when work areas are well outside of the water, and attenuation levels of sound energy through ground versus water is greater, resulting in lower sound levels at an equal distance away from driven piles.

Although some uncertainty exists in approximating acoustic effect threshold distances for the proposed action, due to imperfect comparability of construction and environmental conditions between the example projects and the proposed action, it is expected that these estimated acoustic impacts are conservative because distances between the piles and waters' edge would be much greater for the proposed project than in the source data examples. Furthermore, restricting work and pile-driving the summer months and daily low tides will avoid the seasonal period when federally listed species (namely salmonids) would be present. Surveys conducted through various years suggest that salmonids would likely not be present in the action area during the proposed work window (Pinnix et al. 2013, Wallace et al. 2015). Based on regional salmonid life history, ecological conditions of the action area (lack of preferred deep tidal channels), and primary use of vibratory pile-driving and Conservation Measures incorporated in the proposed action, the potential for the proposed pile-driving activities to cause barotraumas to listed fish species would be unlikely.

5.5. Conservation Measures and Compensation Proposal

5.5.1. Conservation Measures

Conservation measures would be incorporated into the project to minimize potential effects on federally listed species and other biological resources. The proposed Conservation Measures in this BA/EFHA have been designed, in part, to minimize the anticipated temporary and permanent effects associated with the proposed action on the listed fish species discussed in this BA/EFHA. All Conservation Measures are described in detail in Section 1.4.5.

5.6. Effects of Interrelated and Interdependent Actions/Conclusions and Determination

Interrelated and interdependent effects are those that have no significant independent utility apart from the action under consideration, or are part of a larger action and depend on the larger action for their justification (i.e., this action or other actions would not occur "but for" this action). No such actions are associated with the proposed action, and there would not be any interrelated or interdependent effects.

5.7. Cumulative Effects

Cumulative effects are those impacts of future state, local, and private actions affecting endangered and threatened species that are reasonably certain to occur in the action area. Future projects that result in a federal action would be subject to the consultation requirements established in Section 7 of the ESA and, therefore, are not considered cumulative to the proposed action. No reasonably foreseeable future projects within the current project's action area are known at this time.

5.8. Determination

It has been determined based on the contents of this BA/EFHA that the proposed project:

- May affect, is not likely to adversely affect (NLAA) the SONCC ESU coho salmon, CC ESU Chinook salmon, NC DPS steelhead, southern DPS green sturgeon, and the southern DPS eulachon.
- May affect, is not likely to adversely modify designated critical habitat for the SONCC coho salmon, CC ESU Chinook salmon, NC DPS steelhead, and southern DPS green sturgeon.

5.8.1. Discussion Supporting Determination

Potential effects to the threatened SONCC ESU coho salmon, CC ESU Chinook salmon, and NC DPS steelhead, were analyzed. The effects described in this BA would not significantly contribute too, or exacerbate, the primary factors affecting these fish species and their habitat in Humboldt Bay. Proposed project activities would predominantly result in only temporary effects to salmonid habitat.

As described in Section 5.3, documented presence of listed salmonids does occur within the action area. However, with the limited in channel or bay and pile-driving work window, the potential for salmonid presence has been reduced to an insignificant level. Noise levels from pile installation that exceed the behavior threshold may result in temporary changes to fish behavior or injury. The exposure to noise levels from pile installation are not anticipated to exceed the thresholds that result in injuries or mortality to salmonids and no salmonids are anticipated to be present during the limited construction windows.

The project will temporarily affect primary physical and biological features of designated critical habitat in the action area; however, the project is designed to include measures to offset short-term and temporary impacts to aquatic habitat. The primary physical and biological features of critical habitat present in the action area will not be altered or destroyed to the extent that the survival and recovery of federally listed salmonids would be appreciably reduced.

5.9. Conformance with California Endangered Species Act Mitigation Requirements

The County has incorporated avoidance, minimization, and mitigation measures to reduce the potential for disturbance and take of the federal and state listed SONCC ESU coho salmon to a discountable level and adverse modification or temporary loss of its habitat to an insignificant level in the action area. These measures include limiting the in-channel and in-bay work window to seasons (July 1 – September 31) that avoid impacts and disruptions to adult and juvenile salmon. Additional Conservation Measures include implementing BMPs to prevent pollution discharges in waterways and prevent sediment runoff to stream channels to maintain water quality are also included as part of the project design. Details of implementation of avoidance and minimization measures are provided below in Section 5.9.1.

5.9.1. Avoidance, Minimization, and Mitigation Measures for SONCC ESU Coho Salmon

- The County shall adhere to a limited operating period during the low-flow season between July 1 and September 31 for all in water construction work and any dewatering.
- The County shall implement erosion control measures, including a stormwater pollution prevention plan, consistent with provisions of Caltrans Standard Specifications Section 20-2 and 20-3.
- The County shall ensure that all construction equipment, pumps, hand tools, and personnel protective equipment that is to be used in or near waterways is subjected to inspection and appropriate treatments to prevent the spread of invasive plant and aquatic invertebrate species.

Chapter 6. Magnuson-Stevens Fishery Conservation and Management Act of 1976 (as amended)

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) directs the federal government to take actions to conserve and manage fishery resources found off the coasts of the U.S., including anadromous fish species, Continental Shelf fishery resources of the U.S., and fishery resources in the special areas, by exercising sovereign rights for the purposes of exploring, exploiting, conserving, and managing all fish within the U.S. exclusive economic zone.

6.1. Essential Fish Habitat

6.1.1. Essential Fish Habitat Background

Public Law 104-297, the Sustainable Fisheries Act of 1996, amended the Chapter 6 of the MSFCMA to establish new requirements for description in federal fishery management plans of the habitats that are essential to the production of sustainable fisheries (EFH). In addition, the MSFCMA established procedures designed to identify, conserve, and enhance EFH for those species regulated under a federal fisheries management plan.

Pursuant to the MSFCMA, federal agencies must consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH. NMFS must provide conservation recommendations for any federal or state action that would adversely affect EFH. Federal agencies must provide a detailed response in writing to the NMFS within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the effect of the activity on EFH. In the case of a response that is inconsistent with the NMFS EFH conservation recommendations, the federal agency must explain its reasons for not following the recommendations.

EFH has been defined for the purposes of the MSFCMA as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity”. NMFS has further added the following interpretations to clarify this definition:

“Waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate;

"Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities;

"Necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and

"Spawning, breeding, feeding, or growth to maturity" covers the full life cycle of a species.

Adverse effect means any effect that reduces quality and/or quantity of EFH, and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), or site-specific or habitat-wide effects, including individual, cumulative, or synergistic consequences of actions.

EFH consultation with the NMFS is required regarding any federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH. The MSFCMA requires consultation for all federal agency actions that may adversely affect EFH. EFH consultation with NMFS is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of its location. Under Section 305(b)(4) of the MSFCMA, NMFS is required to provide EFH conservation and enhancement recommendations to federal and state agencies for actions that adversely affect EFH. Wherever possible, NMFS utilizes existing interagency coordination processes to fulfill EFH consultations with federal agencies. For the proposed action, this goal is being met by incorporating EFH consultation into the ESA Section 7 consultation, as represented by this BA/EFHA.

6.2. Managed Fisheries with Potential to Occur in the Action Area

MSFCMA requires that EFH be identified for all federally managed species including all species managed by the Pacific Fisheries Management Council (PFMC). The PFMC is responsible for managing commercial fisheries resources along the coast of Washington, Oregon, and California. Managed species that have a potential to occur in the proposed action area are covered under Fishery Management Plans (FMPs).

Chinook and coho salmon, groundfishes, and coastal pelagic fish species, managed under the MSFCMA, may potentially be present in the action area. Chinook and coho salmon are managed under the Pacific Coast Salmon FMP (PFMC 2012), coastal pelagic species are managed under the Coastal Pelagic Species FMP (PFMC 2016), and groundfish species are managed under the Pacific Coast Groundfish FMP (PFMC 2014).

6.3. Potential Effects of Proposed Project on EFH

Potential effects of the proposed action on EFH for Pacific salmon, Pacific groundfish and coastal pelagic fisheries were evaluated based on comparisons of habitat in the action area with descriptions of EFH in the respective FMPs and the list of factors identified to cause adverse effects to EFH. Potential factors associated with the proposed action that may adversely affect EFH for the subject fisheries include those that relate to: (1) sedimentation and turbidity; (2) hazardous materials and chemical spills; (3) re-suspension of contaminants; (4) aquatic habitat modification; and (5) food resources.

6.3.1. Adverse Effects on Essential Fish Habitat for Pacific Salmonids

Effects on EFH for Pacific salmon that may result from implementation of the proposed action include the potential for temporary increases in turbidity and suspended sediment, and minor alteration to physical habitat (migration corridors and tidally-influenced estuarine sloughs and mudflats) in the action area. A detailed description of project effects on key habitat components for anadromous salmonids that also applies to EFH for salmon is provided in Chapter 5 and Table 7.

6.3.2. Adverse Effects on Essential Fish Habitat for Pacific Coast Groundfishes

Effects on EFH for Pacific Coast groundfishes would be similar to that for Pacific salmonid EFH, being limited to potential transient increases in localized turbidity over intertidal mud flats with unconsolidated substrate that may provide suitable habitat and produce prey (primarily shrimp, amphipods, copepods, crabs and polychaete worms) for juvenile flatfishes and skates. Direct effects to EFH would be limited to temporary and permanent (600 square feet) small reductions in available tidally influenced mud flat habitat in Humboldt Bay (aquatic habitat modification). This small reduction in available habitat could reduce the availability of prey items, affecting the feeding component of EFH (food production resources).

Estuaries are considered to be habitat areas of particular concern according to the Pacific Coast Groundfish FMP (PFMC 2014). This designation for estuaries is based on the

importance of the highly productive shallow waters of estuaries and eel grass to groundfish and their prey. No eelgrass is found within the action area. The effects from the proposed project would mainly impact the substrate and feeding components of groundfish EFH. The small reductions in available habitat and impacts to prey species would be negligible compared to the size of Humboldt Bay proper and available habitat. Conservation Measures would be implemented that would reduce the likelihood and potential effects of hazardous materials or resuspension of contaminates that may be in substrates.

6.3.3. Adverse Effects on Essential Fish Habitat for Coastal Pelagic Species

Coastal pelagic species (CPS) subject to the Pacific CPS FMP (PFMC 2016) include finfish (northern anchovy, Pacific sardine, Pacific (chub) mackerel, jack mackerel, and market squid). CPS may occur in shallow embayments and brackish water, but do not depend on these habitats to any significant degree. Potential effects on CPS EFH may result from small and temporary turbidity effects on intertidal mudflats. Mudflat habitat provides areas for production of invertebrate prey that may drift into open water areas of Humboldt Bay, where CPS such as jack mackerel and northern anchovy may occasionally occur and forage. Small localized increases in turbidity and temporary isolation of a small area of the intertidal mudflat near the northern CRC levee access bridge work area may occur during the proposed project. As discussed in previous section, the construction-related turbidity is anticipated to be short lived, a conservative estimate that increased turbidity levels would not extend more than 200 feet from the location of the bridge structures at Brainard's slough and the CRC northern levee access bridge, based on a 15-60 minute decay rate of any turbidity plume.

6.4. Essential Fish Habitat Conservation Measures

The following measures will be implemented to minimize the potential adverse effects to designated EFH described above. For a more detailed description of all Conservations Measures and avoidance and minimization measures refer to Sections 1.4.5.

- Conservation Measure #3- Erosion and Sedimentation Control measures
- Conservation Measure #4 Prevention of Accidental Spills
- Conservation Measure #7 Prevention of Spread of Invasive Species

In addition, Avoidance and Minimization Measures have been identified to further mitigate for potential impacts to salmonids and are described in Section 5.9.1.

6.5. Conclusions

Caltrans has determined that the proposed action will adversely affect EFH for Pacific Coast salmon, groundfishes, and coastal pelagic fishes. The effects of the proposed action on EFH within the action area would be similar to those discussed in Section 5.4. The project would temporarily affect some principal physical or biological features of salmonid critical habitat and elements of EFH for Pacific salmon, Pacific groundfish, and coastal pelagic fisheries. However, the proposed project includes measures to minimize the potential for adverse effects to these habitats. Construction activities could result in temporary and localized increases in turbidity and suspended sediment resulting in short term effects on salmonid habitat quality. Placement of work platforms for construction of the CRC bridges would temporarily reduce the amount of available substrate habitat in the action area, but would have negligible long-term impacts but for the small reduction in tidal mudflat area of Humboldt Bay due to construction of bridge supports. The functional physical or biological features of EFH for Pacific salmon, Pacific groundfish, and coastal pelagic species fisheries will not be permanently altered or destroyed by the proposed action to the extent that the production and sustainability of the affected fisheries would be appreciably reduced.

Chapter 7. Literature Cited

7.1. Literature Cited

Adams, P. B., C. B. Grimes, J. E. Hightower, S. T. Lindley, and M. L. Moser. 2002. Status review for North American green sturgeon, *Acipenser medirostris*. National Marine Fisheries Service.

Alabaster, J. S., and R. Lloyd. 1980. Water quality criteria for freshwater fish. Boston, Massachusetts: Buttersworth, Inc.

Anderson, P. G., B. R. Taylor, and G. C. Balch. 1996. Quantifying the effects of sediment release on fish and their habitats. Canadian Manuscript Report of Fisheries and Aquatic Sciences No. 2346, Department of Fisheries and Oceans.

Allen, S., E. Ojerholm, and M. Wallace. 2016. Juvenile salmonid use and restoration assessment of the tidal portions of selected tributaries to Humboldt Bay, California, 2013-2015. Fisheries Restoration Grant Program Final Report Contract P1110524 March 2016.

Barnhart, R. A., M. J. Boyd, and J. E. Pequegnat. 1992. The ecology of Humboldt Bay, California: An estuarine profile. U.S. Fish and Wildlife Service. Report No. Biological Report 1.

Benson, R. L., S. Turo, and B. W. McCovey Jr. 2007. Migration and movement patterns of green sturgeon (Acipenser medirostris) in the Klamath and Trinity rivers, California, USA. *Environmental Biology of Fishes* 79:269-279

Berg, L., and T. G. Northcote. 1985. Changes in territorial, gill-flaring, and feeding behavior in juvenile coho salmon (*Oncorhynchus kisutch*) following short-term pulses of suspended sediment. Canadian Journal of Fisheries and Aquatic Sciences 42:1410-1417.

Beschta, R. L., R. E. Bilby, G. W. Brown, L. B. Holtby, and T. D. Hofstra. 1987. Stream temperature and aquatic habitat: Fisheries and forestry interactions. In Streamside Management: Forestry and Fishery Interactions, edited by E. O. Salo and T. W. Cundy. Seattle, Washington: University of Washington, Institute of Forest Resources, Contribution No. 57.

Bilby, R. E. 1984. Removal of woody debris may affect stream channel stability. Journal of Forestry 82:609-613.

Bjorkstedt, E. P., B. C. Spence, J. C. Garza, D. G. Hankin, D. Fuller, W. E. Jones, J. J. Smith, and R. Macedo. 2005. An analysis of historical population structure for evolutionarily significant units of Chinook salmon, coho salmon, and steelhead in the north-central California coast recovery domain. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center. October 2005.

Bjornn, T. C., and D. W. Reiser. 1991. Habitat requirements of salmonids in streams. In Influences of forest rangeland management on salmonid fishes and their habitats, edited by W. R. Meehan. Bethesda: American Fisheries Society, Special Publication 19.

Brown, L. R., P. B. Moyle, and R. M. Yoshiyama. 1994. Historical decline and current status of coho salmon in California. North American Journal of Fisheries Management. 14:237-261.

Brown, K. 2006. Evidence of spawning by green sturgeon, *Acipenser medirostris*, in the upper Sacramento River, California. *Environmental Biology of Fishes* 79:297-303.

California Department of Fish and Game. 2002. Comments to NMFS regarding green sturgeon listing.

California Department of Transportation (Caltrans). 2001. Pile installation demonstration project, fisheries impact assessment: PIDP EA 01281, Caltrans Contract 04A0148. San Francisco-Oakland Bay Bridge East Span Seismic Safety Project.

California Department of Transportation (Caltrans). 2015. Technical guidance for assessment and mitigation of the hydroacoustic effects of pile driving on fish. November 2015

Drake, J., R. Emmet, K. Fresh, R. Gustofson, M. Rowse, D. Teel, M. Wilson, P. Adams, E. Spangler, and R. Spangler. 2010. Status review update for eulachon in Washington, Oregon, and California. Eulachon Biological Review Team, January 20, 2010.

Eisler, R. 2000. Handbook of chemical risk assessment: health hazards to humans, plants and animals. Vol. 1, Metals. Boca Raton, Florida: Lewis Press.

Erickson, D. L., J. A. North, J. E. Hightower, J. Weber, and L. Lauck. 2002. Movement and habitat use of green sturgeon Acipenser midirostris in the Rogue River, Oregon, USA. *Journal of Applied Ichthyology* 18:565-569.

Everest, F. H., and D. W. Chapman. 1972. Habitat selection and spatial interaction by juvenile Chinook salmon and steelhead trout. Journal of the Fisheries Research Board of Canada. 29:91-100.

Foltz, R. B., K. A. Yanosed, and T. M. Brown. 2008. Sediment concentration and turbidity changes during culvert removals. Journal of Environmental Management. 87:329-340.

Fritzsche, R. A., and J. W. Cavanagh. 1995. *A guide to the fishes of Humboldt Bay*: HSU Press.

Healey, M. C. 1991. Life history of Chinook salmon (*Oncorhynchus tshawytscha*). In Pacific Salmon Life Histories, edited by C. Groot and L. Margolis. Vancouver: University of British Columbia Press.

Heublein, J. C., J. T. Kelly, and A. P. Klimley. 2006. Spawning migration and habitat of green sturgeon, *Acipenser medirostris*, in the Sacramento River. Paper read at CALFED Science Conference, October 23, 2006, at Sacramento.

Illingworth and Rodkin. 2015. 2015 hydroacoustic compendium of pile driving sound data (Appendix I). Prepared for the California Department of Transportation. October 2012.

Illingsworth and Rodkin 2013. Technical memo: SAS span temporary foundation removal-hydroacoustic measurement results for October 8, 2013. Prepared for Stefan Galvez, California Department of Transportation. 4p.

Jakober, M. 2002. Sheep Creek culvert replacement sediment monitoring. U.S. Forest Service, Bitterroot National Forest.

Jennings, M.R. Past occurrence of eulachon, *Thaleichthys pacificus*, in streams tributary to Humboldt Bay, California. California Fish and Game. 82:147-148.

Keller, E. A., and F. J. Swanson. 1979. Effects of large organic material on channel form and fluvial processes. Earth Surface Processes 4:361-380.

Kynard, B., B. Parker, and T. Parker. 2005. Behavior of early life intervals of Klamath River green sturgeon, *Acipenser medirostris*, with note on body color. *Environmental Biology of Fishes* 72:85-97.

Lestelle, L. C. 2007. Coho salmon (Oncorhynchus kisutch) life history patterns in the Pacific Northwest and California. Prepared for U.S. Bureau of Reclamation Klamath Area Office by Biostream Environmental. March 2007.

Lindley, S. T., D. L. Erickson, M. L. Moser, and others. 2011. Electronic tagging of green sturgeon reveals population structure and movement among estuaries. Transactions of the American Fisheries Society 140:108-122.

Lloyd, D. S. 1987. Turbidity as a water quality standard for salmonid habitat in Alaska. North American Journal of Fisheries Management .7:34-45.

Martin O'Connell Associates. 1991. Humboldt Bay development plan: Final report.

Meehan, W. R., and T. C. Bjornn. 1991. Salmonid distribution and life histories. In Influences of forest and rangeland management on salmonid fishes and their habitats edited by W. R. Meehan. Bethesda: American Fisheries Society Special Publication 19.

Michney, F., and R. Deibel. 1986. Sacramento River, Chico Landing to Red Bluff Project: 1985 juvenile salmonid study. U.S. Fish and Wildlife Service, Division of Ecological Services.

Moore, R. D., D. L. Spittlehouse, and A. Story. 2007. Riparian microclimate and stream temperature response to forest harvesting: A review. Journal of the American Water Resources Association 41(4):813-834.

Moyle, P. B. 2002. Inland fishes of California: University of California Press, Berkeley, CA 502p.

Moyle, P. B., and T. Light. 1996. Fish invasions in California: do abiotic factors determine success? Ecology. 77(6):1666-1670.

National Marine Fisheries Service (NMFS). 1996. Factors for decline: a supplement to the notice of determination for west coast steelhead under the Endangered Species Act. National Marine Fisheries Service, Protected Species Branch and Protected Species Management Division.

National Marine Fisheries Service (NMFS). 2009. Biological opinion and conference opinion on the long-term operations of the Central Valley Project and State Water Project. NOAA's National Marine Fisheries Service Southwest Region. June 2009.

National Marine Fisheries Service (NMFS). 2012. Public Draft SONCC coho salmon recovery plan. National Marine Fisheries Service, Southwest Regional Office. January 2012

Newcombe, C. P., and O. T. Jensen. 1996. Channel suspended sediment and fisheries: a synthesis for quantitative assessment of risk and impact. North American Journal of Fisheries Management. 16:693-727.

Nielson, J. L. 1994. Invasive Cohorts: impact of hatchery-reared coho salmon on the trophic, developmental, and genetic ecology of wild stocks. In Theory and application in fish feeding ecology, edited by D. L. Strouder, K. L. Fresh and R. J. Feller. Columbia, South Carolina: University of South Carolina Press.

O'Farrell, M. R., W. H. Satterthwaite, and B. C. Spence. 2012. California Coastal Chinook salmon: Status, data, and feasibility of alternative fishery management strategies. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center: NOAA-TM-NMFS-SWFSC-494. December 2012.

Pacific Fishery Management Council (PFMC). 2012. Pacific Coast Salmon Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon, and California as Revised Through Amendment 17. PFMC, Portland, OR. 90 p.

Pacific Fishery Management Council (PFMC). 2014. Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish Fishery, as Revised Through Amendment 23. PFMC, Portland, OR. 146 p.

Pacific Fishery Management Council (PFMC). 2016. Coastal Pelagic Species Fishery Management Plan, as Amended Through Amendment 15. PFMC, Portland, OR. 49 p.

Pinnix, W. D., T. A. Shaw, K. A. Acker, and N. J. Hetrick. 2005. Fish communities in eelgrass, oyster culture, and mudflat habitats of North Humboldt Bay, California. US Fish and Wildlife Service.

Pinnix, W.D. 2008. Humboldt Bay – acoustic telemetry –Humboldt Bay residency. Power point presentation. February 15, 2008

Pinnix, W.D., P.A. Nelson, and G.S. Stutzer. 2013. Residence time and habitat use of coho salmon in Humboldt Bay, California: an acoustic telemetry study. Environmental Biology of Fishes 96(2):315-323.

Piper, R. G., I. B. McElwain, L. E. Orme, J. P. McCraren, L. G. L.G. Fowler, and J. R. Leonard. 1982. Fish Hatchery Management. Washington, D.C: U.S. Department of the Interior, Fish and Wildlife Service.

Poytress, W. R., J. J. Gruber, D. A. Trachtenbarg, and J. P. Van Eenennaam. 2009. 2008 Upper Sacramento River green sturgeon spawning habitat and larval migration surveys. Annual Report of U.S. Fish and Wildlife Service to US Bureau of Reclamation, Red Bluff, CA.

Redding, J. M., C. B. Schreck, and F. H. Everest. 1987. Physiological effects on coho salmon and steelhead of exposure to suspended solids. Transactions of the American Fisheries Society 116(5):737-744.

Sandercock, F. K. 1991. Life history of coho salmon (Oncorhynchus kisutch). In C. Groot and L. Margolis (editors), Pacific salmon life histories, p. 396-445. Univ. British Columbia Press, Vancouver.

Schlosser, S., and A. Eigher. 2012. The Humboldt Bay and Eel River estuary benthic habitat project. California Sea Grant Publication T-075. August 2012.

Seesholtz, A.M., M.J. Manuel, and J.P. Van Eenennaam. 2015. First documented spawning and associated habitat conditions for green sturgeon in the Feather River, California. Environmental Biology of Fish 98: 905-912.

Servizi, J. A., and D. W. Martens. 1992. Sublethal responses of coho salmon (Oncorhynchus kisutch) to suspended sediments. Canadian Journal of Fisheries and Aquatic Sciences 49:1389-1395.

Shapovalov, L. and A. C. Taft. 1954. Life histories of the Steelhead rainbow trout (Salmo qairdneri gairdneri) and silver salmon (Oncorhynchus kisutch) with special reference to Waddell Creek, California, and recommendations regarding their management. California Department of Fish and Game, Fish Bull. No. 98. 375 p.

Spence, B. C., E. P. Bjorkstedt, J. C. Garza, J. J. Smith, D. G. Hankin, D. Fuller, W. E. Jones, R. Macedo, T. H. Williams, and E. Mora. 2008. A framework for assessing the viability of threatened and endangered salmon and steelhead in the north-central California coast recovery domain. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center: NOAA-TM-NMFS-SWFSC-423

Thorpe, J. E. 1994. Salmonid fishes and the estuarine environment. Estuaries. 17(1A):76-93.

UC Davis PISCES Database. https://pisces.ucdavis.edu/. Accessed October 2017.

U.S. Army Corps of Engineers. 2012. Five year programmatic assessment and 404 (b) (1) analysis – Humboldt Harbor and Bay Operations and Maintenance (FY 2012-2016). January 2012.

U.S. Fish and Wildlife Service. 2006. Gannon Slough tidegate replacement initial data summary. February 2006.

U.S. Fish and Wildlife Service. 2008. Endangered and Threatened Wildlife and Plants; 12-month Finding on a Petition to List the San Francisco Bay-Delta Population of the Longfin Smelt as Endangered or Threatened. 50 CFR Part 17 Docket No. FWS-R8-ES-2008-0045.

U.S. Fish and Wildlife Service. 2011. Programmatic informal consultation for the California Department of Transportation's Routine Maintenance and Repair Activities, and Small Projects Program for Districts 1 and 2. File No. AFW0-12B0001-12I0001.

Wallace, M., and S. Allen. 2007. Juvenile salmonid use of the tidal portions of selected tributaries to Humboldt Bay, California. Prepared by the Natural Stocks Assessment Project, California Department of Fish and Game and Pacific States Marine Fisheries Commission. June 2007.

Wallace, M., and S. Allen. 2012. Juvenile salmonid use of the tidal portions of selected tributaries to Humboldt Bay, California. Prepared by the Natural Stocks Assessment Project, California Department of Fish and Game and Pacific States Marine Fisheries Commission. February 2012

Wallace, M., S. Ricker, J. Garwood, A. Frimodig, and S. Allen. 2015. Importance of the stream-estuary ecotone to juvenile coho salmon (Oncorhynchus kisutch) in Humboldt Bay, California. California Fish and Game 101(4):241-266.

Wallace, M. 2006. Juvenile salmonid use of Freshwater Slough and tidal portion of Freshwater Creek, Humboldt Bay, California 2003 Annual Report. Natural Stocks Assessment Project. Inland Fisheries. Administrative Report No. 2006-04. California Department of Fish and Game, Northern California – North Coast Region. March 2006.

Williams, T.H., E.P. Bjorkstedt, W.G. Duffy, D. Hillemeier, G. Kautsky, T.E. Lisle, M. McCain, M. Rode, R.G. Szerlong, R.S. Schick, M.N. Goslin, A. Agrawal. 2006. Historical population structure of coho salmon in the Southern Oregon/Northern California Coasts Evolutionarily Significant Unit. NOAA-TM-NMFS-SWFSC-390. National Marine Fisheries Service, Southwest Fisheries Science Center, Santa Cruz, California. 85 p

Williams, T.H., B. Spence, W. Duffy, D. Hillemeier, G. Kautsky, T. Lisle, M. McCain, T. Nickelson, E. Mora, and T. Pearson. 2008. Framework for assessing viability of threatened coho salmon in the Southern Oregon/Northern California Coasts Evolutionarily Significant Unit. NOAA Technical Memorandum NMFS-SWFSC-432. National Marine Fisheries Service, Southwest Fisheries Science Center, Santa Cruz, California. 97 p

Winzler and Kelly. 2010. Biological assessment for the rail-with-trail connectivity. Prepared for the City of Arcata. July 2010.

Weitkamp, L. A., T. C. Wainwright, G. J. Bryant, G. B. Milner, D. J. Teel, R. G. Kope, and R. S. Waples. 1995. Status review of coho salmon from Washington, Oregon, and California. NOAA Technical Memorandum NMFS-NWFSC-23. National Marine Fisheries Service, Northwest Fisheries Science Center Coastal Zone and Estuarine Studies Division and Southwest Region, Protected Species Management Division. September 1995.

Western Regional Climate Center. 2017. Annual temperatures and precipitation. http://www.wrcc.dri.edu/ (accessed October 2017).

Appendix A USFWS and NMFS Species Lists

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arcata Fish And Wildlife Office
1655 Heindon Road
Arcata, CA 95521-4573
Phone: (707) 822-7201 Fax: (707) 822-8411

In Reply Refer To:
Consultation Code: 08EACT00-2018-SLI-0017
Event Code: 08EACT00-2018-E-00262
Project Name: Humboldt Bay Trail South

February 13, 2018

Subject: Updated list of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Arcata Fish And Wildlife Office
1655 Heindon Road
Arcata, CA 95521-4573
(707) 822-7201

Project Summary

Consultation Code: 08EACT00-2018-SLI-0017

Event Code: 08EACT00-2018-E-00262

Project Name: Humboldt Bay Trail South

Project Type: RECREATION CONSTRUCTION / MAINTENANCE

Project Description: Multi-use trail mainly along railroad right of way along Humboldt Bay from Bracut to Eureka

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/40.81809039505296N124.09885654247569W

Counties: Humboldt, CA

Endangered Species Act Species

There is a total of 9 threatened, endangered, or candidate species on this species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

Birds

NAME	STATUS
Marbled Murrelet *Brachyramphus marmoratus* Population: U.S.A. (CA, OR, WA) There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4467	Threatened
Northern Spotted Owl *Strix occidentalis caurina* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1123	Threatened
Western Snowy Plover *Charadrius alexandrinus nivosus* Population: Pacific Coast population DPS-U.S.A. (CA, OR, WA), Mexico (within 50 miles of Pacific coast) There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8035	Threatened
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **proposed** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Reptiles

NAME	STATUS
Green Sea Turtle *Chelonia mydas* Population: East Pacific DPS No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6199	Threatened

Fishes

NAME	STATUS
Tidewater Goby *Eucyclogobius newberryi* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/57	Endangered

Flowering Plants

NAME	STATUS
Beach Layia *Layia carnosa* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6728	Endangered
Menzies' Wallflower *Erysimum menziesii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2935	Endangered
Western Lily *Lilium occidentale* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/998	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Quad Name **Arcata South**
Quad Number **40124-G1**

ESA Anadromous Fish

SONCC Coho ESU (T) - **X**
CCC Coho ESU (E) -
CC Chinook Salmon ESU (T) - **X**
CVSR Chinook Salmon ESU (T) -
SRWR Chinook Salmon ESU (E) -
NC Steelhead DPS (T) - **X**
CCC Steelhead DPS (T) -
SCCC Steelhead DPS (T) -
SC Steelhead DPS (E) -
CCV Steelhead DPS (T) -
Eulachon (T) - **X**
sDPS Green Sturgeon (T) - **X**

ESA Anadromous Fish Critical Habitat

SONCC Coho Critical Habitat - **X**
CCC Coho Critical Habitat -
CC Chinook Salmon Critical Habitat - **X**
CVSR Chinook Salmon Critical Habitat -
SRWR Chinook Salmon Critical Habitat -
NC Steelhead Critical Habitat - **X**
CCC Steelhead Critical Habitat -
SCCC Steelhead Critical Habitat -
SC Steelhead Critical Habitat -
CCV Steelhead Critical Habitat -
Eulachon Critical Habitat - **X**
sDPS Green Sturgeon Critical Habitat - **X**

ESA Marine Invertebrates

Range Black Abalone (E) -
Range White Abalone (E) -

ESA Marine Invertebrates Critical Habitat

Black Abalone Critical Habitat -

ESA Sea Turtles

East Pacific Green Sea Turtle (T) -
Olive Ridley Sea Turtle (T/E) -
Leatherback Sea Turtle (E) -
North Pacific Loggerhead Sea Turtle (E) -

ESA Whales

Blue Whale (E) -
Fin Whale (E) -
Humpback Whale (E) -
Southern Resident Killer Whale (E) -
North Pacific Right Whale (E) -
Sei Whale (E) -
Sperm Whale (E) -

ESA Pinnipeds

Guadalupe Fur Seal (T) -

Essential Fish Habitat

Coho EFH - **X**
Chinook Salmon EFH - **X**
Groundfish EFH - **X**
Coastal Pelagics EFH - **X**
Highly Migratory Species EFH -

MMPA Species (See list at left)

ESA and MMPA Cetaceans/Pinnipeds

See list at left and consult the NMFS Long Beach office 562-980-4000

MMPA Cetaceans -
MMPA Pinnipeds - **X**

Appendix B Site Photographs

Photograph 1. Current condition of the collapsed railroad grade and culverts at the Brainard's Slough crossing. Photograph taken October 10, 2017.

Photograph 2. Location of the proposed CRC north bridge in Humboldt Bay (Segments 5, 6). Photograph taken October 10, 2017.

Photograph 3. Trail prism north of the CRC property, looking north, (Segment 7). Photograph taken October 10, 2017.

Photograph 4. East side of Segment 7 trail prism looking north, depicting some of the eucalyptus to be removed and freshwater ditch present. Photograph taken October 10, 2017.

Photograph 5. Outer perimeter of the CRC property (Segment 5). Photograph taken October 10, 2017.

Photograph 6. Trail Segment 2, the proposed trail will utilize the existing railroad bridge over Eureka Slough. Photograph taken October 10, 2017.

Photograph 7. Estuary habitat along the east side of the southern end of Segment 2.

Appendix C Hydroacoustic Calculations

Project Title	Humboldt Bay Trail South
Pile information (size, type, number, pile strikes, etc.)	CRC locations (north and south) will require driving a total of 28 CISS piles with an estimate of 400 strikes total per day for proofing up to 4 piles (100 strikes per pile).

Fill in green cells: estimated sound levels and distances at which they were measured, estimated number of pile strikes per day, and transmision loss constant.

	Acoustic Metric			
	Peak	SEL	RMS	Effective Quiet
Measured single strike level (dB)	**157**	**136**	**146**	**150**
Distance (m)	**16**	**16**	**16**	

Estimated number of strikes	**400**

Cumulative SEL at measured distance
162.02

	Distance (m) to threshold			
	Onset of Physical Injury			Behavior
	Peak	Cumulative SEL dB**		RMS
	dB	Fish ≥ 2 g	Fish < 2 g	dB
Transmission loss constant (15 if unknown)	206	187	183	150
15	**0**	**0**	**1**	**9**

** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet)

Notes (source for estimates, etc.)

Source: Caltrans (2015) Technical guidance for assessment and mitigation of the hydroacoustic effects of pile driving on fish. Table I.-2-3B. Example data uses Steel H piles driven in bay flats (dry) at 16 meters for the Petaluma River Bridge. This example was chosen because of the similarity to the CRC location (piles driven in bay muds). This example uses steel H piles, but similar size CISS and H piles can have similar acoustic levels according to Caltrans hydroacoustic data (Caltrans 2015). This example also represents a worst-case scenario due to the wetted channel of the Petaluma River being within 52 feet (16 meters). Pile driving will occur during low tides at the CRC location, so water will be well over 52 feet away at this site.

Project Title	Humboldt Bay Trail South
Pile information (size, type, number, pile strikes, etc.)	Brainard's Slough pile driving of 18-inch CISS piles. A total of 10 piles with a high estimate of 400 strikes total per day for proofing up to 4 piles (100 strikes per pile).

Fill in green cells: estimated sound levels and distances at which they were measured, estimated number of pile strikes per day, and transmision loss constant.

	Acoustic Metric			
	Peak	SEL	RMS	Effective Quiet
Measured single strike level (dB)	**175**	**148**	**148**	**150**
Distance (m)	**10**	**10**	**10**	

Estimated number of strikes	**400**

Cumulative SEL at measured distance
174.02

	Distance (m) to threshold			
	Onset of Physical Injury			Behavior
	Peak	Cumulative SEL dB**		RMS
	dB	Fish ≥ 2 g	Fish < 2 g	dB
Transmission loss constant (15 if unknown)	206	187	183	150
15	**0**	**1**	**3**	**7**

** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet)

Notes (source for estimates, etc.)

Source: Caltrans (2015) Technical guidance for assessment and mitigation of the hydroacoustic effects of pile driving on fish. Table I.3-24, page I-43. 24-inch steel shell piles near the Sacramento River, Shasta County. Driven with a vibratory hammer and proofed with an impact hammer. This example was chosen because of the similarity to the Brainard's Slough Bridge location. This would be a worst-case scenario example because it was located in a few inches of water adjacent to the river channel. Pile driving at Brainard's Slough will occur while the piles are out of water during low tides, an estimated 20-30 feet from the wetted slough channel.