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W12b

1-22-0064 (Sequoia Investments X, LLC)

July 13, 2022

EXHIBITS

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Exhibit 1
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NORTHPOINT
CONSULTING GROUP, INC.

MEMORANDUM

FROM: Annje Dodd, PhD, PE

TO: Bente Jansen, Coastal Program Analyst

RE: Coastal Development Permit for a 5-year Repair and Maintenance Plan for Sequoia Investment's Hog Island Dock
Revised April 14, 2022

DATE: **April 14, 2022**

Sequoia Investment X, LLC is applying for a Costal Development Permit to conduct a 5-year repair and maintenance plan for the Sequoia Investment's Hog Island dock located at Bivalve way, Samoa, CA (APN 401-301-007) as part as the conditions for the Emergency Permit issued in October 2021 (Permit #G-1-21-0048). The emergency work was completed on October 29, 2022. The project vicinity map and parcel map are provided as Figure 1 and Figure 2 in Attachment 1.

During the emergency permit assessment, Notthoff Underwater Services conducted an underwater visual inspection of the piles on September 29 and 30, 2021 (Attachment 2). The dive inspection rated the conditions of all piles on dock, pump structures and dolphins with a Timber Pile Condition Rating from no defects (less than 5 % lost material) to severe defects (more than 75% lost material). The dive inspection concluded that the dock has many piles with severe and major defects that require repair. The piles with the severest defects were repaired under the emergency permit (Bent No. 7, 8, and 9). The remaining piles needing repair and maintenance are noted in the diver's inspection report as Bent numbers 4-5, 16-24, and all three dolphins (Figure 3). All repair regions appear to be in open water (Figure 4). The approximate repair regions are noted to be outside the eel grass area. The eel grass range was approximated using Google Earth Imagery and ranges 35-40 feet offshore (Figure 4). The approximate eel grass boundary in the relation to piles needing maintenance is shown on Figure 3. Eel grass mitigation and avoidance will incorporate avoiding disturbance in eel grass areas including avoiding anchoring, grounding, and long periods of shading eelgrass area. Pre- and post-construction eel grass surveys per the California Eelgrass Mitigation Policy will be conducted.

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Proposed Repair Plans (pg. 1 of 4)

The purpose of the 5-year repair and maintenance plan is to allow time flexibility as to when repair and maintenance would occur. Maintenance activities would be limited to July 1 to October 15, the work window specified in the Hog Island Dock Emergency Repair Biological Report by Stillwater Sciences, to avoid impacts to Southern DPS green sturgeon, SONCC coho salmon, CC Chinook salmon, NC steelhead and their designated critical habitat. The replacement of defected piles and any other defect would be determined annually by a licensed contractor. The focus of the repair plan will be on the piles that were identified with sever, major and moderate defects (Table 1).

At each Bent identified with defected piles, the existing four (4) old, wood-creosote piles will be removed and replaced with two (2) steel piles, except at Bent #1. At Bent #1, if the contractor deems necessary, all ten (10) old, wood-creosote piles will be removed and replaced with up to four (4) steel piles. At each Dolphin, all sixteen (16) old, wood-creosote piles will be removed and replaced with four (4) steel piles. The replacement of piles will be conducted, similar to the emergency permit, by replacing the existing wood lateral beams with new steel I-beams (pile caps) and the steel piling will be welded or bolted to the I-beams. Any other defect repair or replacement will follow regulation guidelines, procedures, and the Best Management Practices (BMPs) noted in this plan. The proposed work is temporary in nature and would occur after a few days to a few weeks. This work plan is based on the biology report prepared by Stillwater Sciences, dated October 2021 (Attachment 3).

All work would be staged and conducted from a barge. The Contractor's materials staging area is on the dock in Fields Landing, where the steel piles are stored. The Contractor will load the materials onto the barge and float the barge to the Hog Island dock. The Contractor will utilize vibratory pile driving to install piles and vibratory pile extraction to remove piles. The Contractor will setup and drive the steel foundation pilings with an APE vibratory hammer and install (weld or bolt) the new pile caps (I-beams) on the new pilings. Once the new pilings and pile caps are in place, the failed pilings will be removed with the vibratory hammer. Complete extraction of pilings is proposed. The removed pilings will be hauled, by barge, to staging area and then trucked to the nearest licensed waste facility to be disposed of or recycled per State of California recycling standards.

Exhibit 2
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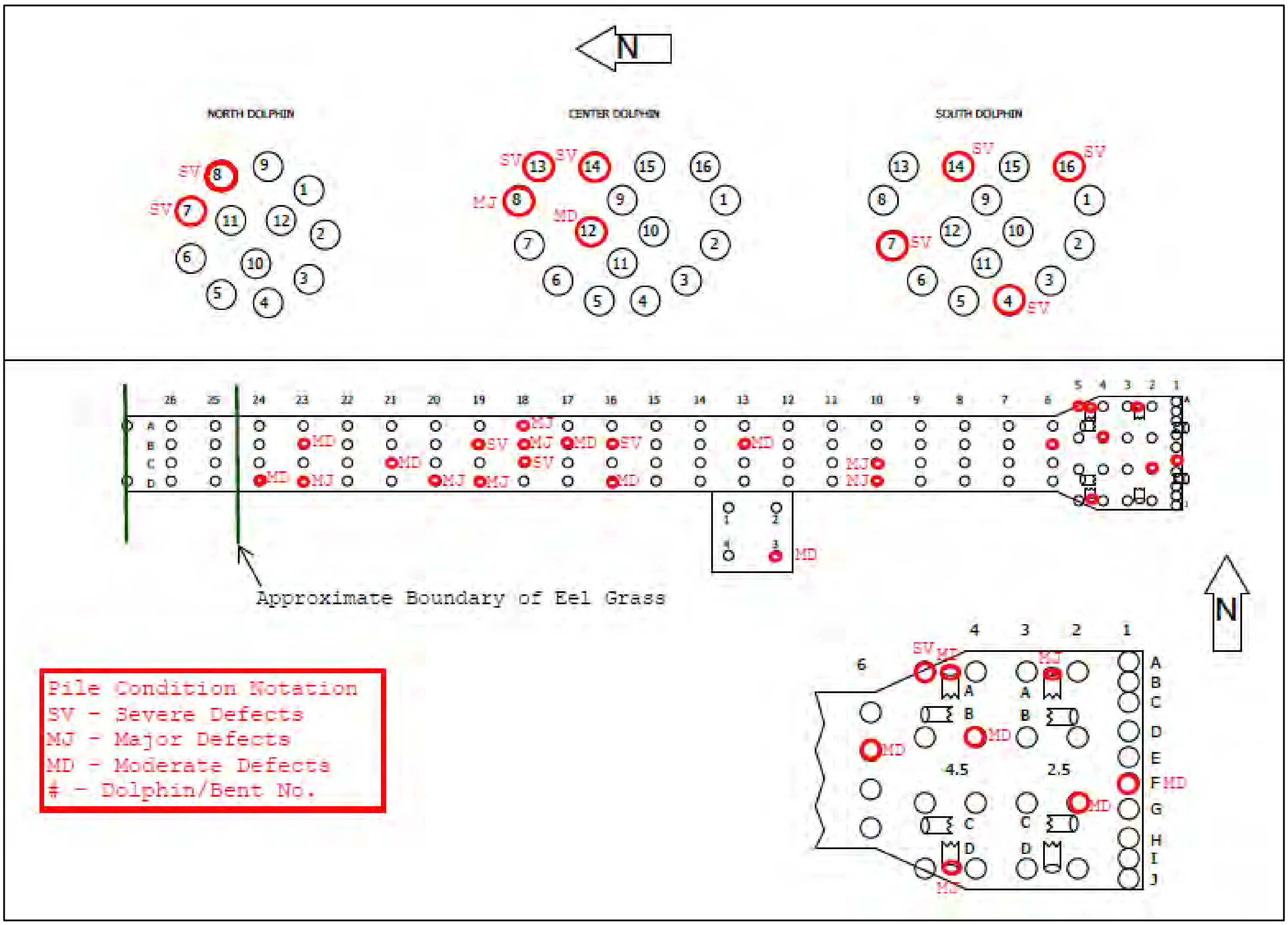

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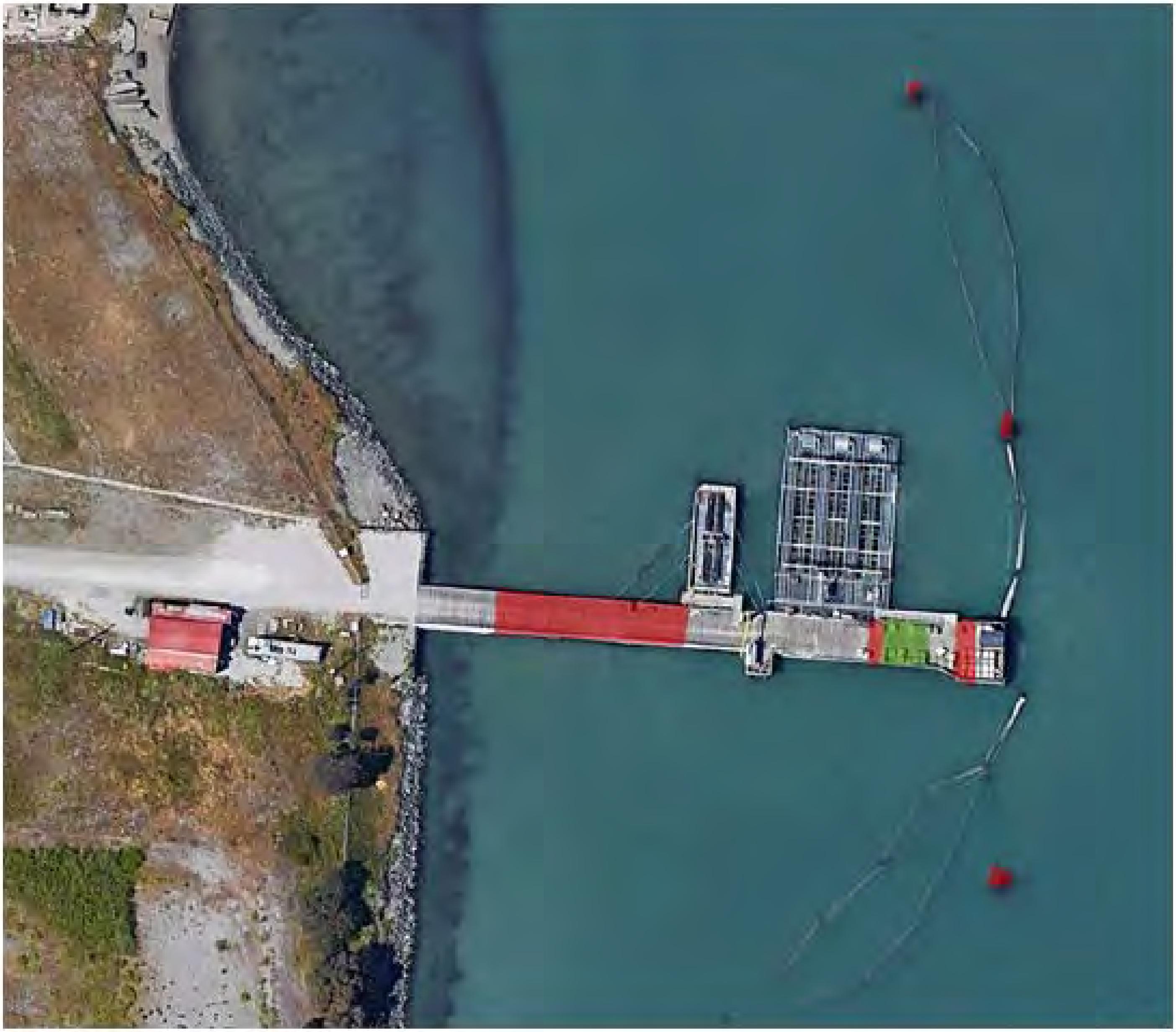

Figure 4. Google Imagery of the Hog Island Oyster Dock with repair area highlighted in red, and previous emergency work area that is completed highlighted in green.

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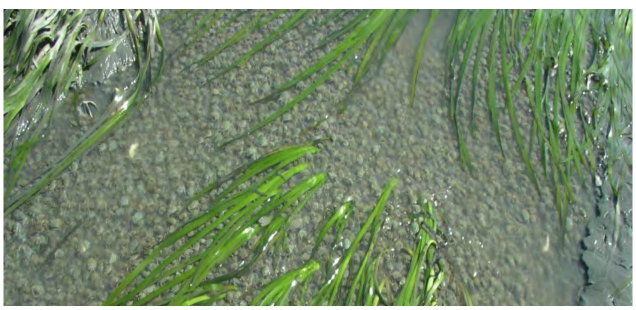
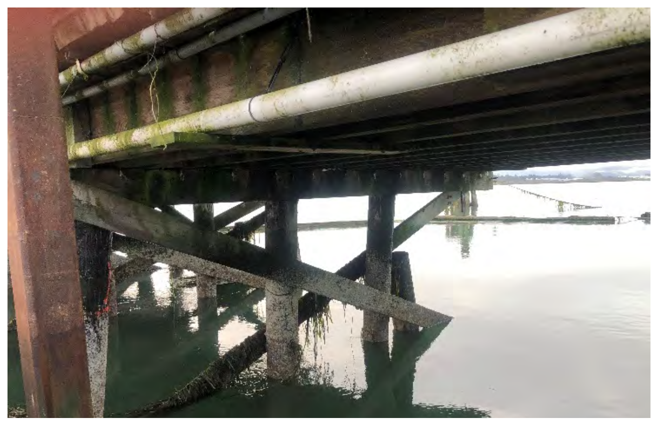
Proposed Repair Plans (pg. 4 of 4)

OCTOBER 2021

Hog Island Dock Emergency Repair Biological Report



PREPARED FOR
Sequoia Investments X, LLC
323 5th Street
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PREPARED BY
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Exhibit 3
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Biological Report Excerpt (pg. 1 of 25)

1 INTRODUCTION

1.1 Background

The Hog Island Oyster Company utilizes a timber dock situated on the tidelands of Humboldt Bay for its mariculture operations (Figure 1). The dock is located in Fairhaven, California, currently owned by Sequoia Investments X, LLC, and leased to Hog Island Oyster Company. The dock is approximately 335 feet (ft) long and 22 ft wide (Figure 2). It is constructed of timber pilings driven in rows that are are connected with 12x12-inch (in) timber cross-members. The cross-members are tied together with stringers, which are then capped with 4x12-in decking. However, the timber pilings supporting a portion of the dock have rotted to the point where the deck is collapsing, unusable by Hog Island Oyster Company, and unsafe.

To determine the extent of the damage and what needs to be done to repair the dock, the dock's owner brought out three separate contractors (West Coast Contractors, Figas Construction, and Mercer Fraser on September 27 and 28, 2021) to inspect the failure area from the dock and from a boat. In addition, Sequoia Investments X, LLC also hired a dive inspector to inspect the piles from underwater (September 29 and 30, 2021). All agreed that the area of failure should be repaired immediately. The dive inspector noticed that three of the piles are no longer in contact with the bay bottom. In addition, some of the pilings no longer support the lateral beams above them. Based on the unsafe nature of the structure, Sequoia Investments X, LLC has determined that emergency repairs are necessary to return it to a safe and operable condition. In general, the emergency repairs consist of removing the 12 failed wooded pilings and overhead supports and replacing them with six new steel pilings and supporting structure (Project).

1.2 Purpose of the Biological Report

The proposed emergency repair project has the potential to adversely affect California and Federal Endangered Species Act (CESA and ESA) fish species, designated critical habitat, and eelgrass beds. The purpose of this biological report is to assess the potential effects of the proposed Project on CESA/ESA-listed species and provide the scientific background for the emergency permit application and approval process.

Figure 1. Project vicinity (Image taken from application for emergency permit).

Figure 2. Hog Island dock with work area and eelgrass visible in shallow water along the western shoreline.

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1.3 Special-status Species and Critical Habitat

A desktop literature review was conducted for known occurrences of plant, fish, and wildlife special-status species and designated critical habitat within a one-mile radius of the project site.

Information on special-status species that may be affected by the project was obtained from the following sources:

- The California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDB 2021),
- U.S. Fish and Wildlife Service (USFWS) list of federally listed and proposed endangered and threatened species and designated critical habitat using the USFWS Information for Planning and Consultation (IPaC) portal (USFWS 2021),
- National Marine Fisheries Service's (NMFS) *California Species List Tools* database (NMFS 2021), and
- Numerous scientific studies, assessment, and surveys.

Tables 1 and 2 lists the special-status plant and animal species and their potential to occur within one mile of the Project. The work area is located out in the deep water of Humboldt Bay and other than staging of the barge, no Project-related activities are planned to occur beyond the specific dock area needing reconstruction. In addition, the work area does not contain suitable habitat for special-status plants or wildlife species. Therefore, plant and wildlife species will not be discussed further in this report. Special-status fish species and their associated critical habitat are present at the Project site.

The nearshore area is occupied by a narrow (35–40 ft wide) strip of eelgrass (*Zostera marina*). The piling work area begins approximately 210 ft east of the eelgrass bed.

This biological report will focus on special-status fish species, designated critical habitat, and eelgrass that are known to occur in the Project area and could be affected by construction operations.

Table 1. Special-status plants with potential to occur in the proposed Project area.

Species name	Status[1] Federal/ State/CRPR	Habitat associations (blooming period)	Source	Likelihood of occurrence at Project site (none, low, moderate, high)
Pink sand-verbena (*Abronia umbellata* ssp. *breviflora*)	–/–/1B.1	Coastal dunes; 0–33 ft (June–October)	CNDDB	**None**: No habitat present.
Oregon coast paintbrush (*Castilleja litoralis* formerly *C. affinis* ssp. *litoralis*)	–/–/2B.2	Coastal bluff scrub, coastal dunes, coastal scrub/sandy; 49–328 ft (June)	CNDDB	**None**: No habitat present
Humboldt Bay owl's-clover (*Castilleja ambigua* var. *humboldtiensis* formerly *C. ambigua* ssp. *humboldtiensis*)	–/–/1B.2	Marshes and swamps; 0–10 ft (April–August)	CNDDB	**None**: No habitat present
Point Reyes bird's-beak (*Chloropyron maritimum ssp. palustre*)	–/–/1B.2	Marshes and swamps; 0–33 ft (June–October)	CNDDB	**None**: No habitat present
Pacific gilia (*Gilia capitata* ssp. *pacifica*)	–/–/1B.2	Coastal bluff scrub, chaparral, coastal prairie, valley and foothill grassland; 16–2,851 ft (April–August)	CNDDB	**None**: No habitat present.
Dark-eyed gilia (*Gilia millefoliata*)	–/–/1B.2	Coastal dunes; 7–66 ft (April–July)	CNDDB	**None**: No habitat present.
Short-leaved evax (*Hesperevax sparsiflora* var. *brevifolia*)	–/–/1B.2	Coastal bluff scrub, coastal dunes; 0–705 ft (March–June)	CNDDB	**None**: No habitat present.
Layia carnosa (beach layia)	FE/CE/1B.1	Coastal dunes, Coastal scrub (sandy); 0–197 ft (March–July)	CNDDB USFWS	**None**: No habitat present.

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Species name	Status[1] Federal/ State/CRPR	Habitat associations (blooming period)	Source	Likelihood of occurrence at Project site (none, low, moderate, high)
Montia howellii (Howell's montia)	–/–/2B.2	Meadows and seeps, north coast coniferous forest, mesic vernal pools, and roadsides; 0–2,395 ft (March–May)	CNDDB	**None**: No habitat present.
Sidalcea malviflora ssp. *patula* (Siskiyou checkerbloom)	–/–/1B.2	Coastal bluff scrub, coastal prairie, north coast coniferous forest/often roadcuts; 49–2,881 ft (May–August)	CNDDB	**None**: No habitat present.
Viola palustris (alpine marsh violet)	–/–/2B.2	Coastal bogs and fens, coastal scrub; 0–492 ft (March–August)	CNDDB	**None**: No habitat present
Western lily (*Lilium occidentale*)	FE/CE/1B.1	Marshes and swamps, bogs and fens, coastal scrub, and coastal prairie; edges of sphagnum bogs and forest openings along margins of ephemeral ponds and stream channels; 6.5–607 ft (June–July)	CNDDB	**None**: No habitat present
Northern clustered sedge (*Carex arcta*)	–/–/2B.2	Bogs and fens; northcoast coniferous forest; 195 – 4,595 ft	CNDDB	**None**: No habitat present
Coast fawn lily (*Erythronium revolutum*)	–/–/2B.2	Cismontane woodland; meadows and seeps; 330 –3775 ft	CNDDB	**None**: No habitat present

[1] **Status:**

Federal	**California Rare Plant Rank**
FE Endangered	1B.1: Plants Rare, Threatened, or Endangered in California and elsewhere; seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat).
– No federal status	1B.2: Plants Rare, Threatened, or Endangered in California and elsewhere; fairly threatened in California (20–80% occurrences threatened/moderate degree and immediacy of threat).
State	2B.1: Plants Rare, Threatened, or Endangered in California, but more common elsewhere; seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat).
CE State endangered	2B.2: Plants Rare, Threatened, or Endangered in California, but more common elsewhere; fairly threatened in California (20–80% occurrences threatened/moderate degree and immediacy of threat).

Table 2. Special-status fish and wildlife species with potential to occur in the project area.

Species name	Status[1] Federal/ State	Distribution	Habitat associations	Source	Likelihood of occurrence at Project site (none, low, moderate, high)
Fish					
North American green sturgeon—Pacific-northern (Northern and Southern Distinct Population Segments [DPS]) (*Acipenser medirostris*)	FT/SSC critical habitat	San Francisco, San Pablo, Suisun, and Humboldt bays; Sacramento-San Joaquin Delta, Sacramento and Klamath rivers	Large mainstem rivers with cool water and cobble, clean sand, or bedrock for spawning. Occupy estuaries and bays for foraging and growth.	CNDDB NMFS	**High**: Known to occur in the North Humboldt Bay. Critical habitat, which includes all tidally influenced areas of Humboldt Bay (including tributaries) up to the elevation of mean higher high water, is present.
Tidewater goby (*Eucyclogobius newberryi*)	FE/SSC critical habitat	Tillas Slough (mouth of the Smith River, Del Norte County) to Agua Hedionda Lagoon (northern San Diego County).	Coastal lagoons and the uppermost zone of brackish large estuaries; prefer sandy substrate for spawning, but can be found on silt and rocky mud substrates; can occur in water up to 15 ft in lagoons and within a wide range of salinity (0–42 ppt).	USFWS	**None**: Habitat not suitable. Designated critical habitat is located in slough habitat about about 3 miles south of the project area.
Eulachon (Southern DPS) (*Thaleichthys pacificus*)	FT/SSC critical habitat	Skeena River in British Columbia (inclusive) south to the Mad River in Northern California (inclusive)	An anadromous fish that historically used the Klamath River estuary and lowest portions of the river to spawn. Few to no individuals currently use the estuary. Most of their life is spent in the ocean.	CNDDB	**None**: Outside of current distribution.
Longfin smelt (*Spirnichus thaleichthys*)	FC/ST	San Francisco estuary from Rio Vista or Medford Island in the Delta as far downstream as South Bay; concentrated in Suisun, San Pablo, and North San Francisco bays; populations in Humboldt Bay, Eel River estuary, and Klamath River estuary	Adults in large bays, estuaries, and nearshore coastal areas; migrate into freshwater rivers to spawn; salinities of 15–30 ppt	CNDDB	**High**: Rearing habitat for juveniles and/or adults is present year-round in Humboldt Bay (CDFW 2015).

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Species name	Status[1] Federal/ State	Distribution	Habitat associations	Source	Likelihood of occurrence at Project site (none, low, moderate, high)
Coho salmon (southern Oregon/ northern California Evolutionary Significant Unit ESU]) (*Oncorhynchus kisutch*)	FT/– critical habitat	Punta Gorda north to the Oregon border	Spawn in coastal streams and large mainstem rivers (i.e., Klamath/Trinity Rivers) in riffles and pool tails-outs and rear in pools > 3 ft deep with overhead cover with high levels oxygen and temperatures of 10–15ºC (50–59°F).	NMFS	**High**: Smolts prefer deep water channels in Humboldt Bay. Adult spawning habitat is located in freshwater. Designated critical habitat is present.
Steelhead (Northern California DPS) (*Oncorhynchus mykiss*)	FT/ST/SSC (ST refers to the summer-run only) critical habitat	Russian River north to Redwood Creek (Humboldt County)	Inhabits small coastal streams to large mainstem rivers with gravel-bottomed, fast-flowing habitat for spawning. However, habitat criteria for different life stages (spawning, fry rearing, juvenile rearing) can vary significantly.	NMFS	**High**: Smolts prefer deep water channels and presence in Humboldt Bay. Adult spawning habitat is located in freshwater. Designated critical habitat is present.
Chinook salmon (California coastal ESU) (*Oncorhynchus tshawytscha*)	FT/– critical habitat	Russian River (Sonoma County) north to Redwood Creek (Humboldt County)	Coastal streams; spawns in gravel riffles	NMFS	**High**: Smolts prefer deep water channels and presence in Humboldt Bay. Adult spawning habitat is located in freshwater. Designated critical habitat is present.
Reptiles					
Green sea turtle *Chelonia mydas (incl. agassizi)*	FT/–	Warm waters of the Pacific coast, primarily from San Diego south. Uncommon along the California coast; does not nest in California.	Uses convergence zones in the open ocean and benthic feeding grounds in coastal areas; nests on sandy ocean beaches	NMFS	**None**: Habitat not suitable.
Leatherback sea Turtle *Dermochelys coriacea*	FE/– Critical habitat	Temperate and cool waters of the Pacific coast; most sightings in California are from boats out at sea; have been observed in open ocean near San Diego, Santa Barbara, Ventura, San Mateo, and Santa Cruz counties; does not nest in California	Pelagic, though also forages near coastal waters	NMFS	**None**: Habitat not suitable.

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Species name	Status[1] Federal/ State	Distribution	Habitat associations	Source	Likelihood of occurrence at Project site (none, low, moderate, high)
Olive (=Pacific) Ridley sea turtle *Lepidochelys olivacea*	FT/–	Warm waters of the Pacific coast, primarily from southern California south; does not nest in California	Well out to sea in pelagic zone as well as coastal areas, including bays and estuaries; nests on sandy ocean beaches	NMFS	**None**: Habitat not suitable.
Birds					
Marbled murrelet (*Brachyramphus marmoratus*)	FT/– critical habitat	Nesting marbled murrelets in California mostly concentrated on coastal waters near Del Norte and Humboldt counties, and in lesser numbers near San Mateo and Santa Cruz counties; winter throughout nesting range, and in small numbers in southern California.	Most time spent on the ocean; nests inland in old-growth conifers with suitable platforms, especially redwoods near coastal areas.	USFWS	**None**: Habitat not suitable. Critical habitat located more than 7 miles from the project area.
Northern spotted owl (*Strix occidentalis caurina*)	ST/SCT, SSC critical habitat	Northwestern California south to Marin County, and southeast to the Pit River area of Shasta County	Usually found in mature and old-growth coniferous forest with dense multi-layered structure	USFWS	**None**: Habitat not suitable. Critical habitat located more than 17 miles from the project area.
Bank swallow (*Riparia riparia*)	–/ST	Summer resident; occurs along the Sacramento River from Tehama County to Sacramento County, along the Feather and lower American rivers; and in the plains east of the Cascade Range in Modoc, Lassen, and northern Siskiyou counties; small populations near the coast from San Francisco County to Monterey County	Nests in vertical bluffs or banks, usually adjacent to water, where the soil consists of sand or sandy loam. Forages over lakes, ponds, rivers and streams.	CNDDB	**None**: Habitat not suitable.
Western snowy plover (*Charadrius alexandrinus nivosus*)	FT (Pacific coastal population) /SSC	Nests in locations along the California coast, including the Eel River in Humboldt County; nests in the interior of the state in the Central Valley, Klamath Basin, Modoc Plateau, and Great Basin,	Barren to sparsely vegetated beaches, barrier beaches, salt-evaporation pond levees, and shores of alkali lakes; also nests on gravel bars in rivers with wide flood plains; needs sandy, gravelly, or friable soils for nesting	USFWS CNDDB	**None**: Habitat not suitable. Critical habitat is located about 3.4 miles south of the project area on the South Spit (land south of the harbor entrance).

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Species name	Status[1] Federal/ State	Distribution	Habitat associations	Source	Likelihood of occurrence at Project site (none, low, moderate, high)
	critical habitat	Mojave, and Colorado deserts; winters primarily along coast			
Western yellow-billed cuckoo (*Coccyzus americanus*)	FT/SE	Breeds in limited portions of the Sacramento River and the South Fork Kern River; small populations may nest in Butte, Yuba, Sutter, San Bernardino, Riverside, Inyo, Los Angeles, and Imperial counties	Valley foothill and desert riparian habitats; nests in open woodland with clearings and low, dense, scrubby vegetation	USFWS	**None**: Habitat not suitable.
Yellow rail (*Coturnicops noveboracensis*)	–/SSC	Extremely rare in California	Densely vegetated sedge marshes/meadows with moist soil or shallow standing water	CNDDB	**None**: Habitat not suitable.
Mammals					
Killer whale (*Orcinus orca*) (Southern Resident DPS)	FE/ Critical habitat	Pacific Ocean	Coastal ocean waters and bays	NMFS	**None**: Habitat not suitable. Sporadic sightings within the entrance to Humboldt Bay.
Sei whale (*Balaenoptera borealis*)	FE	Pacific Ocean	Deep ocean waters far from the coastline	NMFS	**None**: Habitat not suitable.
Blue whale (*Balaenoptera musculus*)	FE	Pacific Ocean	Deep ocean offshore waters; also can be found in coastal waters	NMFS	**None**: Habitat not suitable.
North Pacific right whale (*Eubalaena (=Bal aena) glacialis*)	FE	Pacific Ocean	Deep ocean waters	NMFS	**None**: Habitat not suitable.
Fin whale (*Balaenoptera physalus*)	FE	Pacific Ocean	Deep ocean waters	NMFS	**None**: Habitat not suitable.

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Species name	Status[1] Federal/ State	Distribution	Habitat associations	Source	Likelihood of occurrence at Project site (none, low, moderate, high)
Humpback whale (*Megaptera novaengliae*)	FE	Pacific Ocean	Deep ocean waters	NMFS	**None**: Habitat not suitable.
Sperm whale (*Physeter macrocephalus*)	FE	Pacific Ocean	Deep ocean waters	NMFS	**None**: Habitat not suitable.

[1] **Status: Federal**
FT Threatened
FE Endangered
– No federal status

State
ST Threatened
SE Endangered
SSC Considered a species of special concern by CDFW
– No state status

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2 PROJECT DESCRIPTION

2.1 Project Area

The Project site is located at the east end of Bivalve Street, in the hamlet of Fairhaven, along the western shore of Humboldt Bay (Figure 1). The Project is situated in the northwest corner of Section 28 of Township 5 North, Range 1 West of the Eureka, California USGS 7.5-minute topographic quadrangle. The Project is confined to a 25- x 25-ft (625 square ft) area at the eastern end of the Hog Island dock. An additional 100- x 100-ft area in Humboldt Bay immediately adjacent to the dock will be needed for mooring the barge and crane that will be used to reconstruct the failing portion of the dock structure.

2.2 The Proposed Project

The Project will replace 12 existing 12-inch diameter wood pilings (three rows of pilings, four pilings to a row) with six new 12-inch steel pilings (three rows of pilings, two to a row) (Figure 2). The existing wood cross-member beams will be replaced with new steel I-beams (pile caps) that will be welded or bolted to the steel pilings. The repair work will occur within a 625 square ft area. No laydown areas or work are planned along the shoreline or the western expanse of the dock.

The Project will utilize a 110-ft long by 75-ft wide barge equipped with a large crane that is currently moored at the Humboldt Bay Forest Products dock in Fields Landing, California. The materials staging area is on the Fields Landing dock, where the steel piles are stored. The contractor will load the materials onto the barge and tow the barge to the south side of the Hog Island dock where it will be positioned at high tide in deep water. Grounding of the barge within the eelgrass areas will not occur. All work would be staged and conducted from the barge.

The contractor will utilize vibratory pile driving to install piles. The Contractor will setup and drive the steel foundation pilings with an APE vibratory hammer and install (weld or bolt) the new pile caps (I-beams) on the new pilings. Once the new pilings and pile caps are in place, the Contractor will attach a line from the crane and pull the old piles sideways to break and remove the upper portion at the mud line. The lower portions of the pilings will be abandoned in place so as not to disturb bay sediments. The removed pile material will be placed on the barge and transported to the Contractor's staging area in Fields Landing. The removed pilings will then be trucked to the nearest licensed waste facility to be disposed of or recycled per State of California recycling standards.

2.3 Conservation measures

- The equipment operator is experienced in pile installation. To minimize turbidity in the water column as well as sediment disturbance, piles will be installed using a vibratory a vibratory hammer suspended from a crane located on the barge.
- Work surface on barge deck or pier shall include a containment area for removed pilings and any residual sediment to prevent materials/sediment from re-entering the water. Uncontaminated water run-off can return to the waterway.
    - The containment area shall be constructed of durable plastic sheeting.
    - Containment area shall be removed and disposed in accordance with applicable federal and state regulations.

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  - Upon removal, the pile shall be moved expeditiously from the water into the containment area. The pile shall not be shaken, hosed-off, left hanging to drip or any other action intended to clean or remove adhering material from the pile.
- A floating surface boom shall be installed to capture floating surface debris. Debris will be collected, placed in the containment area, and disposed of along with the disposal of the pilings. The boom shall be located at a sufficient distance from the work area to ensure capture of all work materials. Debris contained within boom shall be removed at the end of each workday or immediately if waters are rough and there is a chance that debris may escape the boom. Piles removed from the water shall be transferred to the containment area without leaving the boomed area.
- A full complement of oil spill clean-up equipment will be on site and available for immediate deployment should there be an accidental discharge of fuel, lubricant, or hydraulic oils. The contractor will immediately implement their spill response plan to contain the spill and notify the appropriate agencies.

2.4 Access Routes

Access by personnel to the construction area will be via existing roads and infrastructure. There will be no material laydown areas along the shoreline.

A conventional barge will be used to access the construction area from the bayside and conduct the pile removal and driving and help with the construction of the new wharf platform.

2.5 Project Timing

Following site preparation activities, in-water construction is planned to begin October 12, 2021 and be completed by October 15, 2021 (Table 3). However, the permittee may request an extension if weather conditions allow.

Table 3. Estimated construction schedule.

Activity	Approximate start date	Approximate completion date
Project plans and surveys	Ongoing	October 10, 2021
Site preparation	October 5, 2021	October 12, 2021
Prepare existing deck for pile driving	October 12, 2021	October 12, 2021
Drive 12-inch steel pilings	October 12, 2021	October 13, 2021
Install load-bearing laterals	October 13, 2021	October 13, 2021
Remove treated timber pilings	October 13, 2021	October 15, 2021
Install deck planks	October 15, 2021	October 15, 2021

3 ENVIRONMENTAL BASELINE

The following description of baseline environmental conditions in the Action Area is drawn primarily from previously developed Humboldt Bay documents, site visits, and habitat and species assessments that were developed specifically for the Action area.

3.1 Physical Environment

3.1.1 Watershed setting

Humboldt Bay is the second largest estuary in California and provides a rich diversity of natural habitats, including tidal marshes, sloughs, and man-made channels, as well as intertidal flats, eelgrass beds, and deepwater estuarine habitats. The Humboldt Bay watershed encompasses approximately 225 square miles containing Douglas-fir and redwood forests (primarily private landownership and commercial timber production east of Highway 101), pastured grasslands, wetlands, and rivers and creeks (tributaries to Humboldt Bay).

3.1.2 Climate and hydrology

The climate in the Eureka area is heavily influenced by its proximity to the Pacific Ocean, with a mean annual temperature of 12°C (53°F) (with extremes ranging from -6 to 31°C [21 to 87° F]); mean annual yearly precipitation of 39 in, and partial or full cloud cover two-thirds of the year on average (Western Regional Climate Center 2013). The predominant wind directions are from the north, and the average wind speed is 7 miles [mi] per hour (Western Regional Climate Center 2013).

3.1.3 Vegetation cover

The primary vegetation communities in the general project vicinity include grassland, mud flats, eelgrass beds, coyote brush scrub, North Coast riparian forest, salt marsh, seasonal wetlands, and drainages. Habitats also include the open water and areas along the shoreline of Humboldt Bay. Eelgrass is present along the shoreline of this portion of the bay (Figure 2). In 2009, Humboldt Bay contained 3,614 acres of continuous eelgrass beds and an additional 2,031 acres of patchy eelgrass beds (Schlosser and Eicher 2012). The property adjacent to the Project is a developed oyster nursery, processing, and distribution center.

3.1.4 Land use

The general project vicinity is dominated by industrial and commercial uses. The project site is The entire shoreline in this area is zoned coastal dependent industrial.

3.1.5 Climate change

Humboldt Bay area is and will continue to be affected by climate change, especially sea level rise (SLR). North of Cape Mendocino, the rate of sea level rise over the next 100 years is expected to range from 0.3 to 4.7 ft (CO-CAT 2013). However, there may be areas where tectonic uplift or subsidence may result in locally lesser or greater amounts of SLR, respectively. For example, the tide gage at the Humboldt Bay north jetty has recorded an average sea-level rise of +4.73 +/- 1.58 mm/yr, equivalent to 1.55 ft/100 years. This is considerably higher than the global average and indicates significant subsidence in this location (CO-CAT 2013). Sixty-five miles north at Crescent City, the tide gage record extends back to 1933 and shows, over the period of record, a local drop in sea level of -0.65 +/-0.36 mm/yr, equivalent to -0.21 ft/100 years (CO-CAT 2013). The drop in sea level is explained by a rising coastline near Crescent City due to flexure of the North American tectonic plate above the subducting Juan de Fuca plate (CO-CAT 2013).

3.2 Status of the Species

3.2.1 Species subject to further analysis

The following species will be included for further analysis of the effect of the Project due to their occurrence in the Humboldt Bay, proximity to the activities, or potential to be affected by the project. These species include southern Distinct Population Segment (DPS) green sturgeon, longfin smelt, Southern Oregon/Northern California Coastal (SONCC) coho salmon, California Coastal (CC) Chinook salmon, and Northern California (NC) DPS steelhead. Species life history summaries are provided below.

3.2.1.1 Southern DPS green sturgeon

NMFS published a final rule listing the southern DPS of green sturgeon as threatened in 2006 (NMFS 2006). There are two Distinct Population Segments (DPSs) defined for green sturgeon—a southern DPS that spawns in the Sacramento River and a northern DPS with spawning populations in the Klamath and Rogue rivers (NMFS 2008a). The southern DPS includes all spawning populations of green sturgeon south of the Eel River in California, of which only the Sacramento River currently contains a spawning population. The southern DPS of green sturgeon has been listed as threatened under the ESA (NMFS 2006), whereas the northern DPS is a Species of Concern. McLain (2006) noted that southern DPS green sturgeon were first determined to occur in Oregon and Washington waters in the late 1950s when tagged San Pablo Bay green sturgeon were recovered in the Columbia River estuary (CDFG 2002a).
Critical habitat for the southern DPS of green sturgeon was designated in 2009 (NMFS 2009). Humboldt Bay and surrounding sloughs and watercourses up to the highest high tide line are within designated critical habitat. The Project area is within designated critical habitat for this species.

Green sturgeon are believed to spend the majority of their lives in nearshore oceanic waters, bays, and estuaries. Early life-history stages reside in fresh water, with adults returning to freshwater to spawn when they are more than 15 years of age and more than 4 ft in size. Spawning is believed to occur every 2–5 years (Moyle 2002). Adults typically migrate into fresh water beginning in late February; spawning occurs in March–July, with peak activity in April–June (Moyle et al. 1995). Females produce 60,000–140,000 eggs (Moyle et al. 1992). Juvenile green sturgeon spend 1–4 years in fresh and estuarine waters before dispersal to saltwater (Beamesderfer and Webb 2002). They disperse widely in the ocean after their out-migration from freshwater (Moyle et al. 1992).

Green sturgeon is a widely distributed marine-oriented species found in nearshore waters from Baja California to Canada (NMFS 2008), but its estuarine/marine distribution and the seasonality of estuarine use range-wide are largely unknown. Southern DPS green sturgeon are known to congregate in coastal waters and estuaries, including non-natal estuaries, such as the Rogue River. Beamis and Kynard (1997) suggested that green sturgeon move into estuaries of non-natal rivers to feed. Information from fisheries-dependent sampling suggests that green sturgeon only occupy large estuaries during the summer and early fall in the northwestern U.S. Green sturgeon are known to enter Washington estuaries during summer (Moser and Lindley 2007). Commercial catches of green sturgeon peak in October in the Columbia River estuary, and records from other estuarine fisheries (Willapa Bay and Grays Harbor, Washington) support the idea that sturgeon are only present in these estuaries from June until October (Moser and Lindley 2007). Green sturgeon tagged in San Pablo Bay were detected in Humboldt Bay in 2006 (Lindley et al. 2011).

No good data exist on current population sizes exist and trend data are lacking (NMFS 2013). Based on tagging data and visual observations, Woodbury (2010, as cited in NMFS 2010) estimated a total of 1,500 spawners. Assuming spawners represent 10% of the population, the number of individuals in the southern DPS would be about 15,000, or somewhat smaller than the estimate for the northern DPS population. However, Lindley et al. (2011) suggested that, based on their tagging data, southern DPS green sturgeon may be more abundant or the northern DPS green sturgeon may be less abundant than supposed by Adams et al. (2007).

Green sturgeon are known to occur in the North Humboldt Bay (area of the bay north of the harbor entrance). This species may forage in the deepwater portions of the bay and move into shallow areas during high tide.

3.2.1.2 Longfin smelt

Longfin smelt were listed as threatened under CESA in 2009. Adult and juvenile longfin smelt can be found in the open waters of estuaries, mostly in the middle or at the bottom of the water column. They tolerate salinities ranging from nearly pure salt water to completely fresh water, though most prefer salinities of 15 to 30 parts per thousand (ppt). Salinities just north of the mouth of Elk River ranged from 32.3 to 33 ppt during 11 January to 16 January 2014 (Central and Northern California Ocean Observing System [CeNCOOS] 2014).

Spawning occurs in fresh water during the winter to early spring (February through April) over sandy or gravel substrate. Most smelt die after spawning, but a few (mostly females) may live another year. The eggs are adhesive and hatch in 40 days when water temperatures are 7 degrees Celsius (°C) (44 degrees Fahrenheit [°F]). Newly hatched larvae are 0.2–0.3 in long. Larvae can be moved downstream to estuaries by high flows but may also spend considerable time in fresh water. Very few larvae (individuals less than 0.8 in in length) are found in salinities greater than 8 ppt. Until they reach about 0.5 in, longfin smelt larvae are concentrated in the upper 1/3 of the water column (CDFG 1992, Bennett et al. 2002). They later descend and tend to occupy the lower 2/3 of the water column (CDFG 1992, Bennett et al. 2002). It takes almost three months for longfin smelt to reach the juvenile stage (USFWS 2012). Based on length frequency analyses, longfin smelt reach 2–3.4 in fork length (FL) at the end of their first year, 3.4–4.8 in FL by the end of their second year, and the relatively few age-3 fish ranged in size from 4.9–5.5 in (Baxter 1999).

Rosenfield and Baxter (2007) reported that longfin smelt catch per unit effort was greater at channel sites >23 ft deep than at shoal sites (<23 ft deep) in the San Francisco Bay estuary in each age group and the difference was significant from the first fall through the second spring of life, and between the second fall and winter of life. This indicates that longfin smelt may preferentially select deep water rather than shallow water habitats. Sampling by the City of San Francisco during several years in the early 1980s detected longfin smelt in the Pacific Ocean, providing additional evidence that some part of this population migrates beyond the Golden Gate Bridge (City of San Francisco and CH2M HILL 1985, as cited in Rosenfield and Baxter 2007). Longfin smelt concentration in deep water habitats combined with migration into marine environments during summer months suggests that longfin smelt may be relatively intolerant of warm waters (Rosenfeld and Baxter 2007). The same may be true for some portions of Humboldt Bay, especially given its shallow nature and summertime warming.

Longfin smelt were historically very common in Humboldt Bay but have experienced a significant decrease in population since the 1970s (CDFG 2009). The reasons for the decline in Humboldt Bay are unknown.

A status review of longfin smelt was conducted by the California Department of Fish and Game (CDFG) prior to the species’ listing under CESA. CDFG (2009) reported:

> “Beginning in 1960 and continuing through fall 1969, HSU professors and students sometimes collected longfin smelt with otter trawls inside and outside Humboldt Bay. Outside Humboldt Bay, sampling occurred along the Samoa Peninsula from just north of the bay entrance and for several miles north along the coast.

> Small numbers of adult and juvenile longfin smelt were captured in recent years inside Humboldt Bay proper and in tributary sloughs (Cole 2004; Pinnix et al. 2005; Mike Wallace, CDFG Fisheries Biologist, personal communication 2007)."

Small-but-consistent catches of a few dozen longfin smelt occurred during annual collections around a dredge disposal site about two miles offshore of Humboldt Bay (Tim Mulligan, Humboldt State University, 2008, reported to J. Milliken, USFWS)."

A juvenile and larval fish survey was conducted in 1969 (Eldridge and Bryan 1969). The authors conducted monthly benthic and oblique trawl surveys at five stations throughout Humboldt Bay, including one station near the Chevron marine terminal. They found that peaks of seasonal abundance occurred in January and February and April and May. Relatively few fish were found between June and December with the lowest catches in August and September (Eldridge and Bryan 1969).

3.2.1.3 Southern Oregon Northern California Coast coho salmon

Southern Oregon/Northern California Coast (SONCC) coho salmon was listed under the ESA as threatened in 1997 (NMFS 1997) and critical habitat was designated in 1999 to encompass reaches of all rivers between the Mattole River in California and the Elk River in Oregon, inclusive (NMFS 1999a).

Coho salmon adults typically begin to migrate upstream from October through late December. Spawning occurs mainly from November through January, with fry emerging from the gravel in the spring, approximately three to four months after spawning. Coho salmon tend to spawn in small streams that flow directly into the ocean, or tributaries and headwater creeks of larger rivers (Moyle 2002, Sandercock 1991). Preferred gravel sizes range from 0.5 to 4.0 in. Adults die within 10–14 days following spawning and embryos hatch after 8–12 weeks of incubation and emerge from the gravel several weeks later. Juveniles may spend one to two years rearing in freshwater (Bell and Duffy 2007) or emigrate to an estuary shortly after emerging from spawning gravels (Tschaplinski 1988). Highest densities are usually associated with pools ≥1 m (3.3 ft) in depth, with plenty of overhead cover, undercut banks, logs, and other woody debris and water temperatures not exceeding 22–25ºC (72–77ºF) for extended periods of time (Moyle et al. 1995). Preferred water temperatures are in the 7–16ºC (45–62ºF) range (Hassler 1987). Coho salmon juveniles are also known to redistribute into non-natal rearing streams, lakes, or ponds, often following rainstorms, where they continue to rear (Peterson 1982). Emigration from streams to the estuary and ocean generally takes place from February through June, peaking in April and May. Downstream migration to the ocean starts around March when the coho are about one year old. The migration peaks around mid-May and continues until mid-June. Coho spend two years at sea before migrating back to their natal streams to spawn.

All SONCC coho salmon stocks between Punta Gorda (in southern California) and Cape Blanco (in Oregon) are depressed relative to past abundance (Weitkamp et al. 1995, Good et al. 2005). In the latest status review by NMFS, Ly and Ruddy (2011) concluded that many coho salmon populations in this ESU are low in abundance, may well be below their depensation thresholds, and that their risk of extinction may also be increasing. Ly and Ruddy (2011) also concluded that the best available updated information on the biological status of this ESU and the threats facing this ESU indicate that it continues to remain threatened and there is cause for concern.

Coho salmon smolts have been reported to reside in Humboldt Bay for an average of 15–22 days prior to leaving the bay for the open ocean (Pinnix et al. 2013). Coho salmon smolts, as observed

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from mobile tracking studies, used deep channels and channel margins more often than floating eelgrass mats, pilings, and docks. In addition, tagged fish were more often detected in the central portions of Humboldt Bay characterized by deep channels with narrow intertidal margins than in other portions of the bay characterized by shallow channels with large intertidal mudflats and eelgrass meadows (Pinnix et al. 2013).

Coho salmon are present in the Project area, primarily on a seasonal basis during the spring and early summer, as they move from freshwater rearing streams to Humboldt Bay and the coastal ocean. Adults also occupy the Project area during their migration back to their natal streams prior to spawning.

3.2.1.4 California Coastal Chinook salmon

California Coastal (CC) Chinook salmon was listed under the ESA as threatened in 1999 (NMFS 1999b). Critical habitat was designated for CC Chinook salmon in 2005, encompassing reaches of all rivers and tributaries south of the Klamath River (exclusive), and north of the Russian River (inclusive), not including those reaches excluded from critical habitat (NMFS 2005). Humboldt Bay has been designated as critical habitat up to the extent of inundation at the highest high tide.

Chinook salmon exhibit two main life-history strategies: ocean-type fish and river-type fish (Healey 1991). Ocean-type fish typically are fall- or winter-run fish that enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of rivers, and spawn within a few weeks of freshwater entry; their offspring emigrate shortly after emergence from the redd (Healey 1991). River-type fish are typically spring- or summer-run fish that have a protracted adult freshwater residency, sometimes spawning several months after entering freshwater. Progeny of river-type fish frequently spend one or more years in freshwater before emigrating.

Chinook salmon in the California Coastal ESU exhibit life history characteristics of the fall-run ecotype. Adult fall-run Chinook throughout their range generally enter estuaries from July to September, remaining in these areas until they become nearly sexually mature before moving upstream as flows increase in the fall. In California, most adult fall-run Chinook enter streams from August through November, with peak arrival usually occurring in October and November (Leet et al. 1992), and spawn from early October through December. Egg incubation generally lasts between 40–90 days at water temperatures of 42.8–53.6°F (6–12°C) (Vernier 1969, Bams 1970, Heming 1982, all as cited in Bjornn and Reiser 1991), and the alevins remain in the gravel for two to three weeks before emerging from the gravel. Fall Chinook salmon fry usually begin outmigration in February or March and continue into late July.

Fall Chinook are currently the most abundant and widespread of salmon stocks in California (Mills et al. 1997). However, fall Chinook salmon abundance has fluctuated widely over recent decades, with some populations often reaching critically low levels. Trends in abundance of Chinook salmon in the California Coastal ESU were reported by the NMFS as being highly variable, with the strongest negative trends generally occurring in southern-most populations (NMFS 1999b). These swings in populations can be seen in the annual fish counts at the Van Arsdale Dam fish ladder on the upper Eel River. In 2012/2013, a record number of fish (3,471) passed the ladder (FOER 2021). However, in 2020/2021 only 212 passed the fish ladder (FOER 2021).

Although not documented, Chinook salmon likely inhabit the Project area as they move from freshwater rearing streams to Humboldt Bay and the coastal ocean, or as they move back to their natal streams to spawn.

3.2.1.5 Northern California Steelhead

The Northern California (NC) DPS steelhead were listed under the ESA as threatened 2000 (NMFS 2000). Critical habitat was designated in 2005, encompassing reaches of all rivers and tributaries between Redwood Creek (Humboldt County) and the Gualala River in Mendocino County, not including those reaches excluded from critical habitat (NMFS 2005).

Steelhead can utilize smaller tributaries with steeper gradients than other anadromous salmonids and can be found in the upper reaches of most large tributaries (unless barriers preclude their upstream migration).

Adult winter steelhead generally begin their spawning migration in October with the peak in December through February. Steelhead spawning occurs in mainstems, tributaries, and intermittent streams (Everest 1973, Barnhart 1986). Reiser and Bjornn (1979) found that steelhead prefer spawning gravels ranging in size from 0.5 to 4.6 in. The survival of embryos is reduced when fines of less than 0.25 in compose 20–25 percent of the substrate. The number of days required for steelhead eggs to hatch is inversely proportional to water temperature and varies from about 19 days at 16°C (60°F) to about 80 days at 6°C (42°F). Fry typically emerge from the gravel two to three weeks after hatching (Barnhart 1986).

Upon emerging from the gravel, fry rear in edgewater habitats and move gradually into pools and riffles as they grow larger. Older fry establish territories, which they defend. Cover is an important habitat component for juvenile steelhead, both as velocity refuge and as a means of avoiding predation (Shirvell 1990, Meehan and Bjornn 1991). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. Young steelhead feed on a variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. In winter, they become inactive and hide in any available cover, including woody debris and the interstitial spaces between cobbles and bounders.

Although not documented, steelhead likely inhabit the Project area as they move from freshwater rearing areas to Humboldt Bay and the coastal ocean, or as they move back to their natal streams to spawn.

4 EFFECTS OF THE PROJECT ON FISH SPECIES AND CRITICAL HABITAT

The activities associated with the Project that may affect listed fish species and designated critical habitat consist of:

- Installation of steel pilings
- Removal of wooden pilings

The effects of the Project of fish species are expected to be primarily due to noise disturbance and generation of suspended sediment that will occur during installation and removal of pilings. The effects of the project on the physical and biological features (PBF) of critical habitat would be limited to water quality, natural cover, and foraging habitat.

4.1 Project-related Effects

4.1.1 Pile driving noise

The noise generated during driving the pilings into the sediment of Humboldt Bay has the potential to result in the injury or mortality of juvenile or adult fish species that may be close to the work area. However, the potential for injury varies depending on whether an impact hammer or vibratory hammer is used to drive the pilings.

The Fisheries Hydroacoustic Working Group (FHWG) has developed agreed-upon injury threshold criteria for listed fish species (FHWG 2008). The FHWG identified sound pressure levels of 206 dB-peak (peak decibels) at 10 meters (m) as being injurious to fish. Accumulated sound exposure levels (SEL) at 10 m of 187 dB for fishes that are greater than 2 grams (g), and 183 dB for fishes below that weight, are considered to cause temporary shifts in hearing, resulting in temporarily decreased fitness (i.e., reduced foraging success, reduced ability to detect and avoid predators) (FHWG 2008). It is unlikely that special-status fish weighing less than 2 g will be present in the Project area during operations.

It must be noted that research summarized in Popper et al. (2014) suggests that cumulative SEL thresholds for injury may be well above 200 dB. However, until there is broad agreement on the use of higher thresholds, those in FHWG (2008) should be used. It is very important to recognize that the FHWG (2008) criteria were developed for impact pile driving only. There are no established injury criteria for vibration pile driving, and resource agencies are less concerned that vibration pile driving will result in injury or other adverse effects on fish (Caltrans 2020). Until injury thresholds are developed for vibratory pile driving, this biological report will rely on the comparison of noise information developed for a number of projects that included both impact and vibration hammers.

Even though it will not be used for the Hog Island project, pile driving with an impact hammer is the most commonly used method. Impact pile drivers are piston-type drivers that use various means to lift a piston (ignition, hydraulics, or steam) to a desired height and drop the piston (via gravity) against the head of the piling in order to drive it into the substrate. In general, an impact hammer driving 12-inch steel pipe pilings can be expected to generate peak dB of 177–192 dB at distances of 33 feet from the piling (Caltrans 2020). The cumulative SELs during impact driving of 12-inch steel pipe pilings have been documented to range from 152 to 177 dB, respectively, at distances of 33 feet from the piling.

Vibratory pile driving, in contrast to impact hammer driving, uses oscillatory hammers that vibrate the piling, causing the sediment surrounding the piling to liquefy and allow penetration. The vibratory hammer produces sound energy that is spread out over time and is generally 10 to 20 dB lower than impact pile driving (Caltrans 2020). For example, peak sound pressure levels averaged 171 dB during vibratory pile driving of 13-inch steel pipe pilings in the Mad River Slough, California. Peak and cumulative SEL noise levels are not likely to exceed injury threshold levels during vibratory hammer pile driving.

Vibratory hammer noise levels generated by installation of steel pipe pilings are not anticipated to result in injury to fish, but the activity could still result in individual fish moving out of the area. Movement away from, or out of, the work area does not rise to the level that there is a likelihood of injury due to disruption of normal behavioral patterns. Any individual fish can resume normal behavioral patterns once out of the annoying range of sound generation. The Project will occur between July 1 and October 15, when adult and juvenile salmonids are not likely to be in the area.

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4.1.2 Suspended sediment

Elevated suspended sediment concentrations (SSCs) in Humboldt Bay are a relatively frequent occurrence. SSC levels can naturally increase due to wave action on shallow mudflats, storm runoff being delivered from local tributaries, and turbid water from the Eel River entering on incoming tides. It is common for SSC in Humboldt Bay to range from 40 to 100 mg/L or more during the year (Swanson et al. 2012). Spikes in turbidity usually begin to occur in September or October with the onset of the wet season, and peak between December and February (Swanson et al. 2012). However, higher peaks of turbidity in the nearshore, ranging from 50 to 250 nephelometric turbidity units (NTU), have been generated during precipitation-related events between March and May (USACE 2012).

Installation and removal of pilings will result in the production of suspended sediment. Suspended sediment concentrations could have a deleterious effect on special-status fish species in the immediate vicinity of the work. It is estimated that installation of the six 12-in steel pipe pilings during will take approximately three 10-hour working days, with each piling taking between one-half to two hours to drive. Therefore, it can be assumed that elevated pile driving-related SSC will occur on six separate occasions and last a couple of hours each— very short duration. In addition, SSC levels will be higher close to the individual pilings and rapidly disperse into the bay once the tide begins to ebb or flood, which will significantly reduce the concentration.

Effects of elevated SSC on fish is a function of duration and concentration (Newcombe and Jensen 1996). Generally, the higher the concentration, the less time it takes for an effect to be felt by the receptor species. The first responses of salmonids and other fish to elevated levels of suspended sediment are alarm, abandonment of cover, and avoidance (Newcombe and Jensen 1996). The establishment of the work window (July 1 to October 15) reduces the potential that there will be any exposure of salmonid species to elevated suspended sediment levels. In addition, relatively high SSC and turbidity conditions are common occurrences in Humboldt Bay (Swanson et al. 2012; USACE 2012) and fish have evolved in that environment. The short duration of the pile driving events, tidal flushing, and limited affected area would reduce the potential for adverse effects on special-status fish species.

4.1.3 Special-status fish

A number of special-status fish species have the potential to be in the Project area and would potentially experience impacts during proposed project activities. These species include green sturgeon (Southern DPS), longfin smelt, southern Oregon/northern California coho salmon, California coastal Chinook salmon, northern California steelhead and longfin smelt. All these species have a moderate to high likelihood to be present in the Project area during year due to its proximity to deeper water habitat in Humboldt Bay.

Potential impacts on these species could include injury or mortality of individuals due to installation or removal of pilings. In addition, short-term degradation of water quality could result from construction activities. Degraded water quality may result from increased turbidity from disturbance of sediment or from accidental spills or leakage from machinery during near or in-water construction activities.

4.1.3.1 Southern DPS green sturgeon

Southern DPS green sturgeon inhabit estuaries along the West Coast during the summer and fall months (Moser and Lindley 2007). Larval and juvenile southern DPS green sturgeon rear in their natal streams within the Central Valley and do not inhabit Humboldt Bay.

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Steel pipe pilings will be driven into the bay substrate as part of the Project. The contractor will employ vibratory pile driving to install the pilings, which will produce sound levels that are below the injury thresholds for fish.

Although pile driving noise levels are not anticipated to result in injury to fish, but the activity could result in individual fish moving out of the area. However, this movement away from the pile driving area would not constitute harassment, which is a form of take. The reason for this is that movement out of the area, especially in Humboldt Bay where there are wide expanses of suitable habitat, does not rise to the level that there is a likelihood of injury due to disruption of normal behavioral patterns. Any individual green sturgeon can resume normal behavioral patterns once it is out of the annoying range of sound generation. Therefore, noise generated by pile driving are unlikely to adversely affect southern DPS green sturgeon.

It is expected that the very short duration of pile driving activities and rapid dispersal of turbid water would reduce the potential for any suspended sediment-related effects on green sturgeon. Therefore, suspended sediment generated by driving is not likely to significantly adversely affect listed southern DPS green sturgeon.

Critical habitat

The Project area is located within designated critical habitat for southern DPS green sturgeon. Within the range of the Southern DPS green sturgeon, the estuarine residency period of the species can be separated into five PBFs or essential habitat types. These include food resources (shrimp, clams, oligochaetes, and benthic fishes), water flow, water quality, water depth, and sediment quality (contaminants) (NMFS 2009). The effects of the Project's activities on designated critical habitat for southern DPS green sturgeon are limited to pile driving and removal activities' effects on the PBFs of food resources and water quality.

The Project will result in the loss of food resources that would exist within the new six pilings' footprints (4.7 ft^2). However, this loss would be mostly mitigated by the reestablishment of 3.1 ft^2 of food resources beneath the four suspended pilings that would be removed. Therefore, the Project is not likely to significantly adversely affect the food resources PBF of designated critical habitat for southern DPS green sturgeon.

The contractor has an oil spill response plan and is fully equipped to handle any accidental discharge of fuel or other hydrocarbons from heavy equipment. If a discharge event does occur the contractor will immediately call the proper regulatory authorities and implement corrective measures as per its response plan. Therefore, accidental hydrocarbon contamination resulting from the Project is not likely to significantly adversely affect water quality PBF in the long-term.

The wooden pilings scheduled for removal were treated with creosote, which leach polycyclic aromatic hydrocarbons into the surrounding substrate and water. The pulling of these treated pilings will remove this source of contamination from the bay. Therefore, the Project will have a beneficial effect on sediment and water quality PBF in the long-term.

4.1.3.2 Longfin smelt

Sound levels produced by the placement and removal of pilings with a vibratory hammer will not rise to the threshold levels of concern as developed by FHWG (2008), and certainly not levels that would kill longfin smelt. In addition, it is expected that relatively few longfin smelt would be in the project area during pile driving operations. Eldridge and Bryan (1969) found that peaks of seasonal abundance occurred in January and February and April and May. Relatively few fish were found between June and December with the lowest catches in August and September (Eldridge and Bryan 1969). Therefore, the sound levels produced by placing steel pilings with a vibratory hammer will not result in significant adverse effects on longfin smelt.

Critical habitat
Longfin smelt are not listed under the ESA, therefore, critical habitat has not been designated for this species.

4.1.3.3 Southern Oregon Northern California Coast coho salmon

Pile driving has the potential to adversely affect any coho salmon that may be in the Project areaa. However, there is a low potential for coho salmon smolts or adults to be present during implementation due to the July 1 to October 15 work window. This work window was established to allow operations to occur during the time period when juvenile and adult coho salmon would likely be residing in the ocean and not the bay.

As discussed in the sections above, the peak and accumulated SEL are not likely to exceed injury threshold levels because a vibratory hammer will be used to place the steel pipe pilings. Although pile driving noise levels are not anticipated to result in injury to fish, the activity could nonetheless result in individual fish moving out of the area. However, this movement away from the pile driving area would not constitute harassment, which is a form of take. The reason for this is that movement out of the area, especially in Humboldt Bay where there are wide expanses of suitable habitat, does not rise to the level that there is a likelihood of injury due to disruption of normal behavioral patterns. Therefore, the noise generated during construction is not likely to result in significant adverse effects on adult or juvenile coho salmon

The very short duration of pile driving activities and rapid dispersal of turbid water would reduce the potential for any suspended sediment-related effects on coho salmon. The in-water operations period (July 1 to October 15) was established to avoid the periods when coho salmon are more likely to be present. Therefore, suspended sediment generated by driving and pulling pilings is not likely to significantly adversely affect listed SONCC coho salmon.

Critical habitat
The PBF of SONCC coho salmon critical habitat within the Action Area is limited to the estuarine area with: (1) water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (2) natural cover such as submerged and overhanging large wood and aquatic vegetation; and (3) juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation (NMFS 2005). The essential features that may be affected by the Project's pile driving and removal activities include water quality, natural cover in the form of aquatic vegetation, and juvenile forage.

The Project includes activities that could degrade the essential feature of water quality. Degraded water quality could result from increased turbidity from disturbance of sediment during pile driving or pulling or hydrocarbon (e.g., gasoline, diesel, lube oil, hydraulic fluid, etc.) spills from dredge equipment. The contractor has an oil spill response plan and is fully equipped to handle any accidental discharge of fuel or other hydrocarbons from heavy equipment. If a discharge event does occur the contractor will immediately call the proper regulatory authorities and implement corrective measures as per its response plan. Therefore, accidental hydrocarbon contamination resulting from the Project is not likely to significantly adversely affect water quality PBF in the long-term.

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The wooden pilings scheduled for removal were treated with creosote, which leach polycyclic aromatic hydrocarbons into the surrounding substrate and water. The pulling of these treated pilings will remove this source of contamination from the bay. Therefore, the Project will have a beneficial effect on sediment and water quality PBF in the long-term.

Eelgrass is located along the shoreline and approximately 210 ft west of the Project area. Even though juvenile coho salmon are more likely to occur in deeper water, eelgrass can periodically provide cover and foraging habitat. The pilings and other dock work will not occur within eelgrass habitat. In addition, the contractor will tow the barge to the south side of the Hog Island dock where it will be positioned at high tide in deep water. The barge will not come into contact with eelgrass at any time. Therefore, the Project will have no impact on eelgrass and its ability to provide foraging and cover habitat for coho salmon.

4.1.3.4 California Coastal Chinook salmon

There is a low potential for adult and juvenile CC Chinook salmon to be present in the Project area during construction activities. This because the July 1 to October 15 work window was established to allow operations to occur during the time period when juvenile and adult Chinook salmon would be more likely to be in the ocean rather than in the bay.

The effects of the Project on Chinook salmon are the same as those described for coho salmon in Section 4.1.3.3. Therefore, the conclusion regarding level of impacts on Chinook salmon is also the same. The noise and suspended sediment generated by the Project is unlikely to significantly adversely affect CC Chinook salmon.

Critical habitat

The PBF of CC Chinook salmon critical habitat within the Action Area is limited to the estuarine area with: (1) water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (2) natural cover such as submerged and overhanging large wood and aquatic vegetation; and (3) juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation (NMFS 2005). The essential features that may be affected by the Project’s pile driving and removal activities include water quality, natural cover in the form of aquatic vegetation, and juvenile forage.

The effects of the Project on designated habitat for CC Chinook salmon are the same as those described for coho salmon in Section 4.1.3.3. Therefore, the conclusion regarding level of impacts on designated critical habitat for Chinook salmon is also the same. Accidental hydrocarbon contamination resulting from the Project is not likely to adversely affect or result in the adverse modification of the water quality PBF in the long-term. Pile driving and removal activities are not likely to adversely affect cover and juvenile and adult forage PBF of critical habitat. The noise and suspended sediment generated by the Project are not likely to significantly adversely affect the water quality, juvenile and adult forage, and cover PBF for CC Chinook salmon.

Removal of the wooden pilings will result in a beneficial effect on the PBF of sediment and water quality. Many of these pilings were treated with creosote, which leach polycyclic aromatic hydrocarbons into the surrounding substrate and water. The pulling of these treated pilings will remove this source of contamination from the bay.

4.1.3.5 Northern California Steelhead

There is a low potential for adult and juvenile NC steelhead to be present in the Project area during the construction period. This because the July 1 to October 15 work window was

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established to allow operations to occur during the time period when juvenile and adult steelhead would be more likely to be in the ocean than in the bay.

The effects of the Project on steelhead are the same as those described for coho and Chinook salmon in Sections 4.1.3.3 and 4.1.3.4. Therefore, the conclusion regarding level of impacts on steelhead is also the same. The noise and suspended sediment generated by the Project are unlikely to significantly adversely affect NC steelhead.

Critical habitat

The PBF of NC steelhead critical habitat within the Action Area is limited to the estuarine area with: (1) water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (2) natural cover such as submerged and overhanging large wood and aquatic vegetation; and (3) juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation (NMFS 2005). The essential features that may be affected by the Project's pile driving and removal activities include water quality, natural cover in the form of aquatic vegetation, and juvenile forage.

The effects of the Project on designated habitat for NC steelhead are the same as those described for coho and Chinook salmon in Section 4.1.3.3 and 4.1.3.4. Therefore, the conclusion regarding level of impacts on steelhead is also the same. Accidental hydrocarbon contamination resulting from the Project is not likely to adversely affect or result in the adverse modification of the water quality PBF in the long-term. Pile driving and removal activities are not likely to adversely affect cover and juvenile and adult forage PBF of critical habitat. The noise and suspended sediment generated by the Project are not likely to significantly adversely affect the water quality, juvenile and adult forage, and cover PBF for NC steelhead.

Removal of the wooden pilings will result in a beneficial effect on the PBF of sediment and water quality. Many of these pilings were treated with creosote, which leach polycyclic aromatic hydrocarbons into the surrounding substrate and water. The pulling of these treated pilings will remove this source of contamination from the bay.

4.2 Project-related Effects on Eelgrass

Eelgrass occupies a 35–40-ft band along the shoreline approximately 210 ft west of the Project area (Figure 2). No construction activities are planned for that area and eelgrass would not be directly affected by construction activities. The only potential for contact with eelgrass could be when the contractor tows the barge to the south side of the Hog Island dock where it will be positioned in deep water. However, the barge will be maneuvered into position at high tide without coming into contact with eelgrass. Therefore, the Project will have no impact on eelgrass.

5 CONCLUSION

Based upon the information presented above, the Project is unlikely to significantly adversely affect Southern DPS green sturgeon, SONCC coho salmon, CC Chinook salmon, NC steelhead, and their designated critical habitat. The Project is also unlikely to significantly adversely affect longfin smelt. The Project would have no impact on eelgrass.