Appendix D

Marine Resources Biological Evaluation

Marine Resources Biological Evaluation Report

Samoa Peninsula Land-based Aquaculture Project

Prepared for Nordic Aquafarms California

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1. Introduction

The purpose of this Marine Resources Biological Evaluation (MRBR), prepared by H. T. Harvey & Associates and GHD, is to address the effects of the discharge water from the Samoa Peninsula Land-based Aquaculture Project (hereafter "Project," described below) from the existing Redwood Marine Terminal II (RMT II) ocean outfall pipe and multiport diffuser on marine (Pacific Ocean) species that are listed as endangered or threatened under the federal Endangered Species Act (ESA) or their designated critical habitat, protected under the Marine Mammal Protection Act, or are California state special status species (Figure 1 – Vicinity Map). A separate report (GHD 2021) analyzed impacts from terrestrial development on aquatic species in the bay.

1.1. Project Area Location and Description

The western endpoint of the outfall diffuser is located approximately 1.5 miles offshore of the Project in the Eureka littoral cell, a 40-mile-long littoral cell that stretches from False Cape, located directly north of Cape Mendocino, to Trinidad Head (TCCSMW 2017). The two major rivers within the cell are the Mad River, about 12 miles north of the Project Site, and the Eel River, about 13 miles to the south. Between these rivers lies the entrance to Humboldt Bay, a coastal lagoon and California's second largest bay that serves as a deep-water port for northern California and a hub for commercial and recreational fisheries and aquaculture. Humboldt Bay runs north and south parallel to the coast, separated from the ocean by narrow sand dunes and armored by jetties along the bay's entrance. The shoreline parallel to the Project Site is composed of sandy beaches backed by dunes and low, sandy cliffs (Griggs et al. 2005). The beaches are regularly replenished with sand as a result of high sediment production from coastal rivers into the ocean, and the Eel River is the major source of sand and fine sediment in this littoral cell (Crockett and Nittrouer 2004; Griggs et al. 2005; TCCSMW 2017).

Sediments at depths of less than 35 meters (m) are well-sorted medium to fine sands, probably due to physical mixing associated with waves and sediment transport (Pequegnat et al. 1995). In 1993 and 1994, off the RMT II outfall diffuser (Louisiana Pulp Mill Diffuser) at depths of 19 to 31 m, benthic substrate was classified as "medium fine" to "very fine" sands; mean grain size in 1994 (in phi units) ranged from 2.89 to 3.39 and average mean phi was 3.03; in 1993 it ranged from 2.87 to 3.21 with an average mean of 3.01 (Pequegnat et al. 1995).

1.2. Project Area History

The RMT II outfall pipe and diffuser formerly discharged approximately15 million gallons per day (MGD) from the currently decommissioned pulp mill. As of 2009, the pulp mill was effectively closed. The Humboldt Bay Harbor, Recreation, and Conservation District is the current owner of the RMT II outfall and associated headworks.

2. Project Description

2.1. Proposed Project

The Project plans to utilize the existing RMT II ocean outfall pipe and multiport diffuser to discharge water from the land-based aquaculture facility to the coastal ocean. The RMT II outfall pipe and diffuser specifications include:

- A 36-inch internal diameter pipe that is approximately 8,200 feet (ft) (2,497 m) long and terminates in an 852 foot (258 m) multiport diffuser in approximately 82 ft (25 m) maximum depth and 79 ft (24 m) average depth.
- The diffuser has 144 ports, each of 2.4-inch diameter. Ports are paired on either side of the pipe at a spacing of 12 ft (3.66 m) between ports. The ports discharge at a 45 degree vertical angle relative to the seabed.

Currently, the RMT II outfall infrastructure is used by DG Fairhaven Power Company (Fairhaven Power) for intermittent batch discharges of 200-400 gallons per minute (GPM). Because of the low Fairhaven Power discharge relative to the outfall infrastructure capacity, much of the diffuser has filled with sediment. Fairhaven Power maintains the openings of the eight diffuser pairs (16 ports) nearest shore to allow discharge from their facility.

A future Samoa sewage treatment plant (STP) will also utilize the RMT II outfall infrastructure with anticipated discharges of 37 and 53 GPM for average dry weather and peak wet weather design conditions, respectively.

The proposed Project will have an average discharge of up to 12.5 million gallons per day (GPD) through the RMT II outfall infrastructure. The preliminary design for the discharge may use up to 32 diffuser pairs (64 of the 144 possible ports). Source waters to the facility will be a mixture of marine (from Humboldt Bay) and treated freshwater (from the Humboldt Bay Municipal Water District via the Mad River). After passing through the aquaculture facility and prior to discharge through the RMT II outfall infrastructure, the effluent will pass through an advanced on-site wastewater treatment plant that includes a moving bed biofilm reactor, a membrane bioreactor and UV-C sterilization.

2.2. Definition of the Project Area

The Project Area is defined as the proximal marine waters, as modelled (GHD 2021), of the future comingled discharge through the multiport diffuser for 1) toxicity risks to marine organisms in a localized area around the diffuser, and 2) nutrient enrichment that may result in water quality degradation (e.g. higher nutrient and/or algae levels) over a larger region of the proximal coastal waters. Temperature and salinity of the effluent is different from ambient ocean conditions at the outfall but diffuses rapidly (within 5 ft of the diffuser) and is not considered further. Additionally, the Project Area includes the area of proximal benthic habitat, as modelled (GHD 2021), of the future comingled discharge from the RMT II multiport diffuser for impacts of sedimentation rates of organic matter to benthic habitat.

2.3. Required Regulatory Approvals

Other public agencies that require permits and approvals include:

- Humboldt County Coastal Development Permit;
- North Coast Unified Air Quality Management District (NCUAQMD) permit;
- Regional Water Quality Control Board (RWQCB) Stormwater National Pollutant Discharge Elimination System (NPDES) & Stormwater Pollution Prevention Plan (SWPPP) (Construction and Industrial);
- California Coastal Commission Coastal Development Permit with California Department of Fish & Wildlife (CDFW) and National Marine Fisheries Service (NMFS) review; and a
- Regional Board NPDES for discharge to the Pacific Ocean via the existing outfall pipe.

2.4. Known Ongoing and Previous Projects in the Area

Existing permitted users of the RMT II Outfall include:

- DG Fairhaven Power, LLC (Order No. R1-2018-0013); and
- Peninsula Community Services District and Samoa Pacific Group Town of Samoa Wastewater Treatment Facility (Order No. R1-2020-0005).

These existing uses of the RMT II Outfall are unrelated to the proposed Project.

3. Regulatory Background

Following is an overview of agencies that have potential oversight of the proposed Project related to biological resources. The regulatory setting is divided into sections on federal, state, and local jurisdiction.

3.1. Federal Jurisdiction

3.1.1. Endangered Species Act (ESA)

The ESA of 1973 (16 USC 1531 et seq.) establishes a national policy that all federal departments and agencies provide for the conservation of threatened and endangered species and their ecosystems. The Secretary of the Interior and the Secretary of Commerce are designated in the ESA as responsible for: (1) maintaining a list of species likely to become endangered within the foreseeable future throughout all or a significant portion of its range (threatened) and that are currently in danger of extinction throughout all or a significant portion of its range (endangered); (2) carrying out programs for the conservation of these species; and (3) rendering opinions regarding the impact of proposed federal actions on listed species. The ESA also outlines what constitutes unlawful taking, importation, sale, and possession of listed species and specifies civil and criminal penalties for unlawful activities.

Pursuant to the requirements of the ESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally listed or proposed species may be present in the project region, and whether the proposed project would result in a "take" of such species. The ESA prohibits "take" of a single threatened and endangered species except under certain circumstances and only with authorization from the USFWS or the National Oceanic and Atmospheric Administration (NOAA) Fisheries through a permit under Section 7 (for federal entities or federal actions) or 10(a) (for non-federal entities) of the Act. "Take" under the ESA includes activities such as "harass, harm, pursue, hunt shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." USFWS regulations define harm to include "significant habitat modification or degradation." On June 29, 1995, a U.S. Supreme Court ruling further defined harm to include habitat modification "…where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."

In addition, the agency is required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under the ESA, or result in the destruction or adverse modification of critical habitat for such species (16 USC 1536[3][4]). If it is determined that a project may result in the "take" of a federally-listed species, a permit would be required under Section 7 or Section 10 of the ESA.

Critical Habitat is defined by the ESA as a specific geographic area containing features essential for the conservation of an endangered or threatened species. Under Section 7 of the ESA, critical habitat should be evaluated if designated for federally listed species that may be present in the project Action Area (federally designated term for a "Project Study Boundary," see Section 4.1).

3.1.2. Marine Mammal Protection Act (MMPA)

The MMPA (16 U.S.C. 1362) of 1972 prohibits the "taking" of marine mammals and restricts the import, export, or sale of marine mammals. Take is defined as "the act of hunting, killing, capture, and/or harassment of any marine mammal; or, the attempt at such." Harassment includes disruption of behavioral patterns. Implementation of the MMPA is divided between USFWS (sea otters, walruses, polar bears, manatees, and dugongs) and NOAA Fisheries (pinnipeds including seals and sea lions and cetaceans including dolphins and whales). Incidental Harassment Authorizations (IHA) or Letters of Authorization (LOA) may be issued for certain activities which can result in small amounts of take associated with another activity.

3.1.3. Clean Water Act (CWA)

The CWA (1977, as amended) establishes the basic structure for regulating discharges of pollutants into waters of the U.S. It gives the U.S. Environmental Protection Agency (EPA) the authority to implement pollution control programs, including setting wastewater standards for industry and water quality standards for contaminants in surface waters. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters, without a permit under its provisions.

Discharge of fill material into "waters of the U.S.," including wetlands, is regulated by the U.S. Army Corps of Engineers (USACE) under Section 404 of the CWA (33 USC 1251-1376). USACE regulations implementing Section 404 define "waters of the U.S." to include intrastate waters (such

as, lakes, rivers, streams, wetlands, and natural ponds) that the use, degradation, or destruction of could affect interstate or foreign commerce. Wetlands are defined for regulatory purposes as “areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (33 CFR 328.3; 40 CFR 230.3). The placement of structures in “navigable waters of the U.S.” is also regulated by the USACE under Section 10 of the Federal Rivers and Harbors Act (33 USC 401 et seq.). Projects are approved by USACE under standard (i.e., individual) or general (i.e., nationwide, programmatic, or regional) permits. The type of permit is determined by the USACE and based on project parameters.

The USACE and the EPA announced the release of the Clean Water Rule on May 27, 2015 (80 FR 124: 37054-37127). The Rule is intended to ensure waters protected under the CWA are more precisely defined, more predictable, easier to understand, and consistent with the latest science. The intent is to: 1) clearly define and protect tributaries that impact the quality of downstream waters; 2) provide certainty in how far safeguards extend to nearby waters; 3) protect unique regional waters; 4) focus on streams instead of ditches; 5) maintain the status of waters associated with infrastructure (i.e., sewer systems); and 6) reduce the need for case specific analysis of all waters. The U.S. Court of Appeals for the Sixth Circuit stayed implementation of the Clean Water Rule pending further action of the court in October 2015. In response, the USACE and EPA resumed case-by-case analysis of waters of the U.S. determinations. Implementation of the Clean Water Rule was pending litigation prior to February 2017. An Executive Order (Restoring the Rule of Law, Federalism, and Economic Growth by Reviewing the “Waters of the United States” Rule) was signed on February 28, 2017, directing the USACE and EPA to review The Rule and publish for notice and comment a proposed rule rescinding or revising The Rule. The USACE and EPA subsequently published a Notice of Intention to Review and Rescind or Revise the Clean Water Rule in the Federal Register on March 6, 2017. The definition of “navigable waters” under the CWA along with The Rule is currently under review per the Executive Order.

The Fish and Wildlife Coordination Act requires consultation with the USFWS, NOAA Fisheries, and responsible state wildlife agency for any federally authorized action to control or modify surface waters. Therefore, any project proposed or permitted by the USACE under the CWA Section 404 must also be reviewed by the federal wildlife agencies and California Department of Fish and Wildlife (CDFW).

Section 401 of the CWA requires any applicant for a federal license or permit, which involves an activity that may result in a discharge of a pollutant into waters of the U.S., obtain a certification that the discharge will comply with applicable effluent limitations and water quality standards. CWA 401 certifications are issued by Regional Water Quality Control Boards (RWQCBs) under the California Environmental Protection Agency.

3.1.4. Migratory Bird Treaty Act (MBTA)

The MBTA of 1918 (16 USC 703-712) as amended established federal responsibilities for the protection of nearly all species of birds, their eggs, and nests. A migratory bird is defined as any species or family of birds that live, reproduce, or migrate within or across international borders at some point during their annual life cycle. The MBTA prohibits the take, possession, buying, selling, purchasing, or bartering of any migratory bird listed in 50 CFR Part 10, including feathers or other

parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). Only exotic species such as Rock Pigeons (*Columba livia*), House Sparrows (*Passer domesticus*), and European Starlings (*Sturnus vulgaris*) are exempt from protection.

In 2001, President Clinton defined “take” in Executive Order 13186 to include both “intentional” and “unintentional.” This was also the interpretation of the Act put forth in an earlier Solicitor’s Opinion (M-37041). However, in December of 2017, the Department of the Interior’s (DOI) Office of Solicitor argued via Opinion M-37050 that incidental take was not prohibited under the Migratory Bird Treaty Act (this interpretation of the Act was also upheld in 2015 by the 5th Circuit in *United States v. CITGO Petroleum Corp*.). Opinion M-37050 was the subject of a lawsuit between eight U.S. states and the U.S. DOI.

In January of 2020, representative Alan Lowenthal and 18 bipartisan sponsors introduced the federal Migratory Bird Protection Act (H.R. 5552). The purpose of this bill was to “[a]mend the Migratory Bird Treaty Act to affirm that the Migratory Bird Treaty Act’s prohibition on the unauthorized take or killing of migratory birds includes incidental take by commercial activities, and to direct the United States Fish and Wildlife Service to regulate such incidental take, and for other purposes” (H.R. 5552). As of March 2020, this bill has yet to pass the House (Congress.gov 2020).

In February of 2020, the USFWS proposed a new rule to define the scope of the MBTA (85 FR 5915). The rule specifies that “the Service proposes to adopt a regulation defining the scope of the MBTA's prohibitions to reach only actions directed at migratory birds, their nests, or their eggs” and essentially codifies M-37050 (85 FR 5915). Public comment on this new proposed rule closed on March 19, 2020. As of March 2020, the interpretation of “take” in the rule by the DOI did not include “incidental take.” This interpretation is currently the subject of litigation (Audubon 2020).

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

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (16 U.S.C. 1801 et seq.) provides the federal government with the authority to manage fisheries in the U.S. Exclusive Economic Zone (EEZ) (from state waters which end three nautical miles offshore to a distance of 200 nautical miles). In addition, the Act mandates inter-agency cooperation in achieving protection, conservation, and enhancement of Essential Fish Habitat (EFH). The Act defines EFH as "Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of EFH: 'waters' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic 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 a species' full life cycle" (50 CFR 600.10).

EFH guidelines also address Habitat Areas of Particular Concern (HAPCs) that should be evaluated within EFH. HAPCs may include both designated areas and designated habitat types. HAPCs are designated by the Fishery Management Council based on:

- “ The importance of the ecological function provided by the habitat;

- The extent to which the habitat is sensitive to human-induced environmental degradation;
- Whether, and to what extent, development activities are or will be stressing the habitat type; and
- The rarity of the habitat type“ (Pacific Fishery Management Council 2016).

EFH designations serve to highlight the importance of habitat conservation for sustainable fisheries and sustaining valuable fish populations. EFH relates directly to the physical fish habitat and indirectly to factors that contribute to degradation of this habitat. Important features of EFH that deserve attention are adequate water quality, temperature, food source, water depth, and cover/vegetation. Adverse effects to EFH are considered to be “any impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions” (50 CFR 600.10). Federal agencies are required to consult with National Marine Fisheries Service (NMFS) regarding any actions (may include funding, permitting, or activities) that may adversely impact EFH.

3.1.6. Sustainable Fisheries Act of 1996

The Sustainable Fisheries Act (SFA) (Public Law 104-107) serves as an amendment to the MSFCMA to “authorize appropriations, to provide for sustainable fisheries, and for other purposes.” The SFA includes requirements for describing EFH in Fishery Management Plans (FMP) and also mandates the protection EFH. According to the SFA, “[o]ne of the greatest long-term threats to the viability of commercial and recreational fisheries is the continuing loss of marine, estuarine, and other aquatic habitats. Habitat considerations should receive increased attention for the conservation and management of fishery resources of the United States.” This act also mandates the delineation of EFH for all managed species.

3.2. State Jurisdiction

3.2.1. California Environmental Quality Act (CEQA)

CEQA applies to certain activities of state and local public agencies. A public agency must comply with CEQA when it undertakes an activity defined by CEQA as a "project." A project is an activity undertaken by a public agency or a private activity which must receive some discretionary approval. Under CEQA, a variety of technical studies including biological, cultural, traffic, and air quality studies as well as research and professional knowledge are considered to determine whether the project may have an “adverse effect” on the environment. Lead agencies are charged with evaluating the best available data when determining what specifically should be considered an “adverse effect” to the environment.

3.2.2. Porter-Cologne Water Quality Act

The Porter-Cologne Act provides for statewide coordination of water quality regulations by establishing the California State Water Resources Control Board. The State Board is the statewide authority that oversees nine separate RWQCBs that collectively oversee water quality at regional and local levels. California RWQCBs issue CWA Section 401 Water Quality Certifications for possible pollutant discharges into waters of the U.S. or state. On April 2, 2019 the California State Water Resources Control Board adopted new definitions and procedures for discharges of dredged or fill material to Waters of the State.

3.2.3. Water Quality Control Plan for Ocean Waters off California

The Ocean Plan, as amended in 2019, is one of five statewide water quality control plans established by the State Water Resources Control Board to preserve and enhance California's territorial ocean waters for the use and enjoyment of the public. This is achieved by controlling the discharge of waste into the ocean and seawater intake. Discharge of waste can include stormwater runoff, municipally treated sewage outflow, and other discharges by industry under regional and state board permits. These plans, which are the State Water Board's master water quality planning documents, designate beneficial uses, water quality goals, and include programs to achieve these objectives.

3.2.4. Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California.

The California Thermal Plan provides temperature standards for territorial seas off California. New discharges in coastal waters should be discharged away from the shoreline to achieve dispersion through the vertical water column, and not exceed the natural temperature of receiving waters by more than 20°. In addition, the discharge shall not result in increases in natural water temperature exceeding 4°F at the shoreline or beyond 1,000 ft from the discharge. The goal is to assure protection of beneficial uses.

3.2.5. California Endangered Species Act (CESA)

The CESA includes provisions for the protection and management of species listed by the State of California as endangered, threatened, or designated as candidates for such listing (California Fish and Game Code (FGC) Sections 2050 through 2085). The CESA generally parallels the main provisions of the ESA and is administered by the CDFW, who maintains a list of state threatened and endangered species as well as candidate species. The CESA prohibits the "take" of any species listed as threatened or endangered unless authorized by the CDFW in the form of an Incidental Take Permit. Under FGC, "take" is defined as to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

3.2.6. Other State Special Status Species and Communities

The CDFW maintains a list of species of special concern. These are broadly defined as species that are of concern to the CDFW because of population declines and restricted distributions, and/or they are associated with habitats that are declining in California. The criteria used to define special

status species are described by the CDFW. Impacts to special status plants, animals, and sensitive natural communities may be considered significant under CEQA.

State Species of Special Concern include those plants and wildlife species that have not been formally listed, yet are proposed or may qualify as endangered or threatened. In addition, USFWS Birds of Conservation Concern, and CDFW special status invertebrates are considered special status species by CDFW.

3.2.7. California Fish and Game Code (FGC)

Fully Protected Species

The CDFW enforces the FGC, which provides protection for “fully protected birds” (Section 3511), “fully protected mammals” (Section 4700), “fully protected reptiles and amphibians” (Section 5050), and “fully protected fish” (Section 5515). As fully protected species, the CDFW cannot authorize any project or action that would result in “take” of these species even with an incidental take permit

3.2.8. Coastal Act

The California Coastal Act (California Public Resources Code sections 30000 et seq) was enacted by the State Legislature in 1976 to provide long-term protection of California’s 1,100-mile coastline for the benefit of current and future generations. Coastal Act policies constitute the standards used by the California Coastal Commission (Commission) in its coastal development permit decisions and for the review of local coastal programs (LCPs) prepared by local governments and submitted to the Commission for approval. The Humboldt Bay Area Plan of the Humboldt County Local Coastal Program (Humboldt LCP) will dictate development on the terrestrial portion of the project, while the Coastal Act will govern for the effluent discharge and thus Humboldt LCP is not further discussed in this report. The Coastal Act is also used by the Commission to review federal activities that affect the coastal zone. Among other things, the policies require:

- Protection and expansion of public access to the shoreline;
- Protection, enhancement and restoration of environmentally sensitive habitats;
- Protection of productive agricultural lands, commercial fisheries and archaeological resources; and
- Protection of the scenic beauty of coastal landscapes and seascapes.

The project is located within the Coastal Zone, within the state’s jurisdiction. All new development proposed on tide and submerged lands, and other public trust lands must receive a permit from the Commission (PRC 30519(b), and 30416(d)).

4. Methods

4.1. Definition of Project Study Boundary (PSB)

For the purposes of this report, the Project Study Boundary (PSB) includes the offshore area affected by effluent discharge from the RMT II outfall pipe and diffuser, approximately 500 m away

from the multiport diffusers at the outfall, as shown in Figure 2 – Project Study Boundary for Marine Resources Biological Evaluation.

4.2. Preliminary Investigation

4.2.1. Database Searches (CNDDB, IPaC, and NMFS)

A database search of the CNDDB (CDFW 2020a), USFWS Information for Planning and Conservation (IPaC) (USFWS 2020), NOAA Essential Fish Habitat Mapper (NMFS 2020a), and NOAA Fisheries West Coast Region California Species List Tools (NMFS 2020b) was conducted by GHD on April 28, 2020. The search encompassed seven U.S. Geological Survey (USGS) quadrangles (quads) centered on the Project Area quad (Eureka) and the surrounding eight quads (Tyee City, Arcata North, Arcata South, McWhinney Creek, Fields Landing, and Cannibal Island). In addition, citizen science databases such as eBird and iNaturalist were reviewed for additional local wildlife information (eBird 2020, iNaturalist 2020).

Based on these database results, literature review, and professional expertise regarding the habitat and conditions surrounding the Project Area, scoping tables were compiled for marine wildlife species (**Appendix A**). These tables and the species accounts below summarize special status wildlife species that may be present in the Project Area. These tables also present information such as the likelihood of each species to occur in the Project Area. Analysis includes all special status wildlife species tracked by CNDDB that are known to occur within a 5 mile radius of the Project Area.

4.2.2. Agency Coordination

Pre-Project meetings have been held with the U.S. Army Corps of Engineers, North Coast Regional Board Water Quality Control Board, Humboldt Bay Harbor, Recreation, and Conservation District, California Coastal Commission, Humboldt County Planning Department, National Marine Fisheries Service, State Lands Commission, and California Department of Fish and Wildlife.

4.2.3. Additional Outreach

Additional outreach to the commercial and recreational fishing community resulted in a list of non-special status species of interest. While not state or federally listed, these commercial and recreational species were also considered with respect to an evaluation of potential Project-related impacts.

4.3. Offshore Effluent Discharge Evaluation

GHD (2020) conducted a numerical modelling assessment of the effluent discharge from Nordic Aquafarms California LLC Samoa Peninsula Land-based Aquaculture Project to support the National Pollutant Discharge Elimination System (NPDES) and Coastal Commission Coastal Development Permit permitting and mixing zone characterization for the proposed facility, forming the basis for evaluating the effects of effluent discharge on marine resources.

The Nordic land-based aquaculture facility will use a mixture of marine (from Humboldt Bay) and freshwater (from the Mad River). Once passing through the aquaculture facility, the effluent will be

treated via onsite waste water infrastructure, including a moving bed biofilm reactor, a membrane bioreactor, and UV-C sterilization that will eliminate bacteria from discharge. Once treated, the discharge (on average, 8,681 GPM) will be comingled with discharge from other users (DG Fairhaven Power Company and future Samoa sewage treatment plant) and discharged through the RMT II outfall and diffuser. The Project will open an additional 24 diffusers (48 ports). When combined with the existing 8 open diffusers (16 ports), a total of 32 diffusers (64 open ports) would be operational (GHD 2021).

PCBs and dioxins are persistent environmental pollutants with low solubility in water that bind to sediments and are present in Humboldt Bay. Currently, the RMTII dock supplies Humboldt Bay water to various aquaculture efforts that include shellfish operations and sea salt production. The Nordic facility will use ultrafiltration, Ozonation, and 250 mJ/cm2 UV disinfection for its intake water removing sediment, fine particles, parasites and inactivating pathogens. The intake water treatment system will ensure dioxin and PCBs cannot enter the Nordic facility. Effluent from the facility will be treated using 0.04 micron ultrafiltration MBRs and 300 mJ/ cm2 UV disinfection.

The Dilution Analysis was conducted to support the National Pollutant Discharge Elimination System (NPDES) and Coastal Commission permitting and mixing zone characterization for the Project and to provide a technical basis for biological evaluations related to marine (Pacific Ocean) species. Specifically, the study examined water quality objectives and modelled the discharge to evaluate the toxicity mixing zone, the zone of potential water quality impairment, and zone of potential benthic impacts from particulate organic loads.

Water quality objectives were adopted based on the temperature and toxicity mixing zone water quality objective concentrations prescribed in California's Temperature Plan (SWRCB 1998, as cited in GHD 2021) and Ocean Plan (SWRCP 2019), respectively (Table 4.1). Guidelines/standards (i.e., water quality objective concentrations) for water quality degradation (i.e., dissolved inorganic nutrients) do not exist, therefore, the 80th percentile of the ambient marine data was adopted, which represents maintenance of a slightly to moderately disturbed ecosystem (ANZECC & ARMCANZ 2000, as cited in GHD 2021) (Table 4.1).

Numerical modeling of discharge on water quality evaluated toxicity risk and nutrient enrichment for both summer and winter oceanic conditions (e.g., ocean currents, tides, wind forcing, stratification, river inflows) (GHE 2020).The water quality objectives were established for the 1) toxicity mixing zone, which is defined as the area in which water quality objectives (WQOs) for chronic[1] or acute[2] toxicity to marine organisms are likely to be exceeded in the marine waters in immediate proximity of the diffuser due to the comingled discharge, and 2) zone of potential water quality degradation, defined as the area in which WQOs for ambient marine water quality are likely to be exceeded, which is substantially larger than the toxicity mixing zone (Table 4.1). Two dilution targets were estimated (GHD 2021): the mixing zone dilution target (DTMZ) related to marine toxicity (i.e., ammonia) and salinity/temperature stress, and the zone of potential water quality degradation (DTWQ) related to nutrient enrichment of the proximal marine environment.

[1] Chronic toxicity is the development of adverse effects (e.g. inhibited growth) from long term exposure to a toxicant or stressor.

[2] Acute toxicity are adverse effects (e.g. death) from short-term exposure.

Table 4.1 Adopted Water Quality Objective Threshold Values (GHD 2021)

Parameter	Units	Mixing Zone WQOs	WQ Degradation WQOs	Source / Basis
Water Temperature Increase (DT)	°F	4	NA	Temperature Plan (SWRCB 1998) defines mixing zone a 4°F increase above ambient.
Salinity Decrease (S)	psu	1	NA	Difference between median and 20th percentile of salinity in Table 2 used as acceptable decrease prior to salinity stress for proximal flora/fauna. No guidance provided in the Ocean Plan (SWRCB 2019), so percentile approach utilized.
Ammonia (NH_3)	mg/L	0.6	NA	Ocean Plan (SWRCB 2019) toxicant value. The adopted ammonia WQO threshold used in this investigation of 0.6 mg/L is the 6-month median limiting concentration in Table 3 of the Ocean Plan (SWRCB 2019), which offers greater protection of marine aquatic life than the daily maximum limiting concentration (2.4 mg/L) and instantaneous maximum limiting concentration (6 mg/L).
Reduced Inorganic Nitrogen (NH_X)	mg/L	NA	0.064	80th percentile of representative background ambient concentrations in Table 2 as per ANZECC & ARMCANZ (2000) and consistent with EPA (2001). This represents the Ocean Plan (SWRCB 2019) stipulation (clause II D 6) that “Nutrient materials shall not cause objection aquatic growths or degrade indigenous biota”.
Oxidized Inorganic Nitrogen (NO_X)	mg/L	NA	0.225	
Orthophosphate (PO_4)	mg/L	NA	0.060	

Conclusions from the dilution study indicated:

1. The predicted zone of marine toxicity and physiological stress to biota is readily met within less than 5 ft of the diffuser on the basis of the near-field modelling. It is noteworthy that the NH_3 effluent concentration (0.004 mg/L) of the future NAFC aquaculture facility will be substantially lower than the numeric water quality objective (0.6 mg/L).
2. The predicted zone of water quality degradation is dependent on salinity stratification of ambient marine waters. During summer (no or weak stratification), surface waters (0-2 m) are predicted to exceed the adopted threshold beyond ~1 km of the diffuser for 1% of the time, with smaller spatial scale patterns for the mid-water column (2-16 m), and near the sea bed (>16 m) is predicted to exceed the adopted threshold for 1% of the time beyond ~50 m and

5% of the time beyond ~25 m of the diffuser, posing very low risk of deleterious water quality impacts. During winter high river flows leading to strong salinity stratification of ambient waters, surface waters are predicted not to exceed adopted thresholds at any time, because the plume remains in the mid-water column (2-16 m) and is predicted to exceed the adopted threshold beyond ~1 km for 1% of the time and ~50 m for 20% of the time, and near the seabed (>16 m) is predicated to exceed the adopted threshold for 1% of the time beyond ~450 m and 5% of the time beyond 100 m from the diffuser, posing a very low risk of deleterious water quality and benthic impacts.

3. Particle settling velocity modelling predicted a zone of potential benthic impact from the gross sedimentation of organic particles onto the seabed from comingled discharge for summer and large river flow scenarios to be below the threshold for benthic impacts (2 g/m^2/day) within ~25 m of the diffuser, posing a low risk of impact to the benthic community in the proximity of the diffuser. Additionally, due to the wave dynamics along the north coast, which the model did not include, it is expected that dilution and mixing would be greater than predicted based only on tides, currents, stratification, and winds.

5. Results

5.1. Summary of General Biological Resources

In the vicinity of the diffuser, benthic and pelagic habitats support a wide variety of organisms, including commercially and recreationally important fish and invertebrates, and habitat for prey of marine species of concern. Planktonic invertebrates include larval stages of commercially important invertebrate species such as Dungeness Crab (*Metacarcinus magister*). Planktonic invertebrates are also important prey for many species of birds, mammals, and fish. The major planktonic invertebrate groups in the California Current ecosystem include copepods, euphausids, crab megalopae, amphipods, squid, and gelatinous zooplankton (Brodeur et al. 2008; Miller and Brodeur 2007; Pool and Brodeur 2006). The benthic infauna community includes polychaetes, amphipods, gastropods, bivalves, ophiuroids, and nemerteans (ERC 1976), and the epibenthic community includes commercially and recreationally important Dungeness Crab, as well as *Crangon spp.,* and mysids, that also form an important prey base for fish, marine mammals, and seabirds. Inshore of the diffuser, nearshore fish that are caught in commercial and recreational beach fisheries include night smelt (*Spirinchus starksi*), surf smelt (*Hypomesus pretiosus*), and several species of surf perch including redtail surfperch (*Amphisticus rhodoterus*) and shiner perch (*Cymatogaster aggregata*) (H. T. Harvey & Associates et al. 2015). Due to the distance from the diffuser and based on the results of numeric modeling (GHD 2021), water quality within Humboldt Bay would be unimpacted by the treated effluent.

5.2. Marine Resources Evaluation Results

5.2.1. Special Status Wildlife

The results in **Table 5.1** are based on database and literature review, as no special status wildlife surveys have been conducted on site.

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Table 5.1 Marine Species Potential to Occur in the Project Area

Scientific Name	Common Name	FedList	CalList	GRank[2]	SRank[2]	Other Status	Habitat Requirements[1]	Potential to Occur in the Project Area and PSB
Mammals								
Balaenoptera borealis	Sei Whale	FE	None	G3	N2	MMPA-Protected	Marine.	**No Potential.** Rare to Northern California, occurs offshore on continental shelf and slope.
Balaenoptera musculus	Blue Whale	FE	None	G3G4	N1	MMPA-Protected	Marine.	**Low Potential.** Occurs offshore to continental shelf break, inshore occasionally.
Balaenoptera physalus	Fin Whale	FE	None	G3G4	N2	MMPA-Protected	Marine.	**Low Potential.** Occurs on continental slope, nearshore occasionally.
Eubalaena japonica	North Pacific Right Whale	FE	None	G1	N1	MMPA-Protected	Marine.	**No Potential.** Occurs further offshore on the continental shelf and slope
Eschrichtius robustus	Gray Whale	None	None	G4	N4	MMPA. Protected	Marine.	**High Potential.** Occurs on continental shelf and nearshore, regularly migrates in Project Area with some year-round residents
Eumetopias jubatus	Steller Sea Lions	None	None	G3	S2	MMPA-Protected	Marine and bay.	**High Potential.** Occurs along the coast, continental shelf and slope, adults and juveniles year-round.

Scientific Name	Common Name	FedList	CalList	GRank[2]	SRank[2]	Other Status	Habitat Requirements[1]	Potential to Occur in the Project Area and PSB
Megaptera novaeangliae	Humpback Whale	FE	None	G4	N3	MMPA-Protected	Marine.	**Low Potential.** Occurs on continental shelf and occasionally nearshore, typically spring through fall.
Orcinus orca	Southern Resident Killer Whale	FE	None	G4G5T1	N1	MMPA-Protected	Marine.	**Low Potential.** Occurs primarily on the continental shelf and occasionally nearshore.
Orcinus orca	West Coast Transient Killer Whale	None	None	G4G5T3Q	NNR	MMPA-Protected	Marine.	**Low Potential.** Occurs primarily on the continental shelf and occasionally nearshore and in Humboldt Bay.
Phoca vitulina richardii	Pacific Harbor Seal	None	None	G5T5Q	N5	MMPA-Protected	Marine and bay.	**High Potential.** Occurs nearshore and in Humboldt Bay, year-round.
Phocoena phocoena	Harbor Porpoise	None	None	G4G5	N4N5	MMPA-Protected	Marine and bay.	**High Potential.** Common in coastal waters year-round, including the Project Area.
Physeter macrocephalus	Sperm Whale	FE	None	G3G4	NU	MMPA-Protected	Marine.	**No Potential.** Occurs offshore on continental shelf and slope.
Zalophus californianus	California Sea Lion	None	None	G5	N4	MMPA. Protected	Marine and Bay.	**High Potential.** Occurs on the coastal, continental shelf and slope, adults and juveniles year-round.

Scientific Name	Common Name	FedList	CalList	GRank[2]	SRank[2]	Other Status	Habitat Requirements[1]	Potential to Occur in the Project Area and PSB
Birds								
Brachyramphus marmoratus	Marbled Murrelet	FT	SE	G3G4	S1	CDF_S-Sensitive | IUCN_EN-Endangered | NABCI_RWL-Red Watch List	Feeds near-shore; nests inland along coast from Eureka to Oregon border and from Half Moon Bay to Santa Cruz. Nests in old-growth redwood-dominated forests, up to six miles inland, often in Douglas-fir, where critical habitat is designated.	**High Potential.** Forages in nearshore habitat, typically <1.5 km from shore (Hébert and Golightly 2008) but can occur further offshore (2.925 km) (Raphael et al. 2014). Numerous near-shore records off the Samoa Peninsula (CDFW 2020a).
Phoebastria albatrus	Short-tailed Albatross	FE	N	G1	S1	CDFW_SSC-Species of Special Concern | IUCN_VU-Vulnerable | NABCI_RWL-Red Watch List	Forages offshore in areas of upwelling. Nests on Japanese Islands | Northern Pacific Ocean | Sea of Okhotsk. Islands with bare ground/grass	**Low Potential.** Species is extremely rare along the west coast of the U.S. (non-breeding season only). Only breeds on offshore islands in Japan and recently Midway atoll (BirdLife International 2020). Recent records indicate mostly distributed

Scientific Name	Common Name	FedList	CalList	GRank[2]	SRank[2]	Other Status	Habitat Requirements[1]	Potential to Occur in the Project Area and PSB
							surrounded by cliffs.	offshore (e.g., >5 miles, USFWS 2014).
Reptiles								
Dermochelys coriacea	Leatherback Sea Turtle	FE	N				Marine.	**Low Potential.** Rare in northern California coastal waters north of Point Arena, based on at-sea, aerial surveys, and telemetry surveys. They tend to occur in offshore (pelagic waters offshore of the 2,000 m isobaths), and are therefore unlikely to occur in Project area (77 FR 4170).
Lepidochelys olivacea	Olive Ridley Sea Turtle	FT	N				Marine.	**Low Potential.** In the eastern Pacific Ocean, olive ridley sea turtles generally occur from southern California to northern Chile. The species is rare off the northern California coast, and occurrences of the olive ridley sea turtle are highly unlikely in the Project area (NMFS and USFWS 2014).

Scientific Name	Common Name	FedList	CalList	GRank[2]	SRank[2]	Other Status	Habitat Requirements[1]	Potential to Occur in the Project Area and PSB
Chelonia mydas	Green Sea Turtle aka East Pacific Green Sea Turtle	FT	N	G3	S1	IUCN_EN-Endangered	Marine bay. Marine. Completely herbivorous; needs adequate supply of seagrasses and algae.	**Low Potential.** Occurs primarily in coastal and bay waters off San Diego County, rare off Northern California due to cold water temperatures and upwelling influence (Seminoff et al. 2015). No recent sightings of green sea turtles along the northern California coast as reported in the latest 5-year review of the species (Seminoff et al. 2015).
Fish								
Acipenser medirostris	North American Green Sturgeon, Southern Distinct Population segment (DPS)	FT	None	G3	S1S2	AFS_VU-Vulnerable | CDFW_SSC-Species of Special Concern | IUCN_NT-Near Threatened | NMFS_SC-Species of Concern	Aquatic | Klamath/North coast flowing waters | Sacramento/San Joaquin flowing waters. These are the most marine species of sturgeon. Abundance increases northward of Point Conception. Spawns in the	**High Potential.** Spends most of their lives in coastal marine waters, coastal bays, and estuaries along the Pacific coast, including Humboldt Bay (Lindley et al. 2011). Project area is within designated critical habitat, which extends offshore to the 328-ft (100-m) isobaths (74 FR 52300).

Scientific Name	Common Name	FedList	CalList	GRank[2]	SRank[2]	Other Status	Habitat Requirements[1]	Potential to Occur in the Project Area and PSB
							Sacramento, Klamath, & Trinity Rivers at temperatures between 8-14°C. Preferred spawning substrate is large cobble, but can range from clean sand to bedrock.	
Entosphenus tridentatus	Pacific Lamprey	None	None	G4	S4	AFS_VU-Vulnerable | BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | USFS_S-Sensitive	Aquatic | Klamath/North coast flowing waters | Sacramento/San Joaquin flowing waters | South coast flowing waters. Found in Pacific Coast streams north of San Luis Obispo County, Pacific lamprey spawn in freshwater streams and rivers including tributaries to Humboldt Bay,	**Moderate Potential.** Juveniles migrate to the ocean where they become parasitic on host species (e.g., fish, cetaceans). Host species include both nearshore species such as Pacific herring and starry flounder, and offshore species including sablefish and blue whales. Pacific hake are a common host of Pacific Lamprey, and are prey to locally common nearshore predators including California sea Lions, Stellar Sea Lions,

Scientific Name	Common Name	FedList	CalList	GRank[2]	SRank[2]	Other Status	Habitat Requirements[1]	Potential to Occur in the Project Area and PSB
							Mad River, and the Eel River. The larvae filter-feed in freshwater habitat before migrating to the ocean as juveniles.	and Pacific harbor eals (Clemens et al 2019).
Oncorhynchus kisutch	Coho Salmon - southern Oregon / northern California Evolutionarily Significant Unit (ESU)	FT	ST	G4T2Q	S2?	AFS_TH-Threatened	Aquatic | Klamath/North coast flowing waters | Sacramento/San Joaquin flowing waters. Federal listing refers to populations between Cape Blanco, Oregon and Punta Gorda, Humboldt County, California. State listing refers to populations between the Oregon border and Punta	**High Potential.** Coho Salmon spawn in tributaries to Humboldt Bay, the Mad and Eel rivers, and migrate from freshwater juvenile rearing habitat to the ocean. Coho Salmon feed in coastal waters.

Scientific Name	Common Name	FedList	CalList	GRank[2]	SRank[2]	Other Status	Habitat Requirements[1]	Potential to Occur in the Project Area and PSB
							Gorda, California.	
Oncorhynchus mykiss irideus pop. 16	Steelhead - northern California DPS	FT	None	G5T2T3Q	S2S3	AFS_TH-Threatened	Aquatic | Sacramento/San Joaquin flowing waters. Coastal basins from Redwood Creek south to the Gualala River, inclusive. Does not include summer-run steelhead.	**High Potential.** Steelhead spawn in tributaries to Humboldt Bay, the Mad and Eel rivers, and migrate from freshwater juvenile rearing habitat to the ocean. Steelhead feed in coastal waters.
Oncorhynchus tshawytscha	Chinook Salmon - California Coastal ESU	FT	None	G5	S1	AFS_TH-Threatened	Aquatic | Sacramento/San Joaquin flowing waters. Federal listing refers to wild spawned, coastal, spring & fall runs between Redwood Cr, Humboldt Co & Russian River, Sonoma Co.	**High Potential.** Chinook salmon spawn in tributaries to Humboldt Bay, the Mad and Eel rivers, and migrate from freshwater juvenile rearing habitat to the ocean. Chinook Salmon feed in coastal waters.
Thaleichthys pacificus	Eulachon	ST	None	G5	S3	None	Aquatic | Klamath/North	**No Potential.** The southernmost distribution

Scientific Name	Common Name	FedList	CalList	GRank[2]	SRank[2]	Other Status	Habitat Requirements[1]	Potential to Occur in the Project Area and PSB
							coast flowing waters. Found in Klamath River, Mad River, Redwood Creek, and in small numbers in Smith River and Humboldt Bay tributaries. Spawn in lower reaches of coastal rivers with moderate water velocities and bottom of pea-sized gravel, sand, and woody debris.	of eulachon is considered to be the Mad River (75 FR 3012). No observations of eulachon in the Mad River since the late 1960's (Simpson 2019). Eulachon are generally believed to be extirpated south of the Klamath River.

Footnotes:

[1] General habitat, and microhabitat column information, reprinted from CNDDB (April 2020).

[2] Rankings from CNDDB (April 2020)

Column Header Categories and Abbreviations:

FedList: Listing status under the federal Endangered Species Act (ESA) – E (endangered); T (threatened); C (candidate); P (proposed); UR (under review); D (delisted)

CalList: Listing status under the California state Endangered Species Act (CESA) - E (endangered); T (threatened); C (candidate)

Scientific Name	Common Name	FedList	CalList	GRank[2]	SRank[2]	Other Status	Habitat Requirements[1]	Potential to Occur in the Project Area and PSB

GRank: Global Rank from NatureServe's Heritage Methodology (NatureServe 2020) (ranking according to degree of global imperilment - G1 = Critically Imperiled—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors; G2 = Imperiled—At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors; G3 = Vulnerable—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors; G4 = Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors; G5 = Secure—Common; widespread and abundant. Subspecies/variety level: "Subspecies/varieties receive a T-rank attached to the G-rank. With the subspecies/varieties, the G-rank reflects the condition of the entire species, whereas the T-rank reflects the global situation of just the subspecies or variety" (CDFW 2019); ? = " Denotes inexact numeric rank" (NatureServe 2020); Q = " Questionable taxonomy that may reduce conservation priority" (NatureServe 2020)

SRank: State Rank from NatureServe's Heritage Methodology (NatureServe 2020) (ranking according to degree of imperilment in the state (California) - S1 = Critically Imperiled—Critically imperiled in the state because of extreme rarity (often 5 or fewer populations) or because of factor(s) such as very steep declines making it especially vulnerable to extirpation from the state; S2 = Imperiled—Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state; S3 = Vulnerable—Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from the state; S4 = Apparently Secure—Uncommon but not rare in the state; some cause for long-term concern due to declines or other factors; S5 = Secure—Common, widespread, and abundant in the state; SNR = State Not Ranked

Other Status: Other federal or state listings may include:

BLM_S (Bureau of Land Management Sensitive): "(1) species listed or proposed for listing under the Endangered Species Act (ESA), and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA, which are designated as Bureau sensitive by the State Director(s). All Federal candidate species, proposed species, and delisted species in the 5 years following delisting will be conserved as Bureau sensitive species." (CDFW 2020b);

CDF_S: (California Department of Forestry and Fire Protection Sensitive): "those species that warrant special protection during timber operations" (CDFW 2020b); **CDFW_FP** (CDFW Fully Protected Animal): "This classification was the State of California's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish, amphibians and reptiles, birds and mammals. Most of the species on these lists have subsequently been listed under the state and/or federal endangered species acts." (CDFW 2020b);

Scientific Name	Common Name	FedList	CalList	GRank[2]	SRank[2]	Other Status	Habitat Requirements[1]	Potential to Occur in the Project Area and PSB

CDFW_SSC (CDFW Species of Special Concern): "It is the goal and responsibility of the Department of Fish and Wildlife to maintain viable populations of all native species. To this end, the Department has designated certain vertebrate species as 'Species of Special Concern' because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. The goal of designating species as 'Species of Special Concern' is to halt or reverse their decline by calling attention to their plight and addressing the issues of concern early enough to secure their long-term viability" (CDFW 2020b);

IUCN_NT (International Union for Conservation of Nature Near Threatened): "when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future (IUCN 2012);

IUCN_VU (International Union for Conservation of Nature Vulnerable): "when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable…, and it is therefore considered to be facing a high risk of extinction in the wild" (IUCN 2012);

IUCN_EN (International Union for Conservation of Nature Endangered): "when the best available evidence indicates that it meets any of the criteria A to E for Endangered…,and it is therefore considered to be facing a very high risk of extinction in the wild" (IUCN 2012);

NABCI_RWL (North American Bird Conservation Initiative Red Watch List): "species with extremely high vulnerability" (CDFW 2019); and

USFS_S (U.S. Forest Service Sensitive): "plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density and/or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution" (CDFW 2020b).

Potential to Occur:

No Potential. Habitat on and adjacent to the Project Area is clearly unsuitable for the species requirements (cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).

Low Potential. Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the Project Area is unsuitable or of very poor quality. The species is not likely to be found in the Project Area.

Moderate Potential. Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the Project Area is unsuitable. The species has a moderate probability of being found in the Project Area.

High Potential. All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the Project Area is highly suitable. The species has a high probability of being found in the Project Area.

Present/Not Present. Detected or excluded (habitats only) during site visits.

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5.2.2. Special Status Species Descriptions

Special Status Mammals

California Sea Lion — California Sea Lions are restricted to middle latitudes of the eastern North Pacific (ENP) Ocean. Protection under the 1972 Marine Mammal Protection Act (MMPA) has allowed the species to recover and the U.S. population was estimated at 257,606 individuals along the U.S. West Coast in 2014 (Carretta et al. 2019a). California Sea Lions typically feed over the continental shelf within the 1,650-ft (500-m) isobath, with foraging diving depths on average within 165-ft (50-m) of the surface (Costa et al. 2007). California Sea Lions do not breed along the Humboldt County coast; however, non-breeding or migrating individuals occur in the PSB. Two seasonal peaks of California Sea Lions are observed in the PSB: one during the fall northward migration and one during spring (mid-April) as they return to breeding colonies in the south (Griswold Jr. 1985; Lowry and Forney 2005; Sullivan 1980). Therefore, this species is likely to occur in the PSB, particularly in spring and fall. Because California Sea Lions are highly mobile along the coast, their exposure to the diffuser effluent is likely to be short term.

Steller Sea Lion — The Steller Sea Lion was federally listed as threatened in 1990 (55 FR 49204). In 1997, the eastern population (i.e., east of 144° W longitude) was listed as threatened, and the western population (i.e., west of 144° W longitude) was listed as endangered (62 FR :24345). Critical habitat was designated in 1993, and includes Sugarloaf Island, Cape Mendocino, Southeast Farallon Island, and Año Nuevo Island in California (58 FR 4526). Steller Sea Lions do not dive deeply and they forage over the continental shelf at night, usually within 12 miles of the colony (Loughlin 2008). Individuals rarely come ashore on the mainland, but haul out on islands and offshore rocks and even remain at sea during stormy weather (Kenyon and Rice 1961). Steller Sea Lions breed along the Humboldt County coast and their presence in the marine and coastal portions of the PSB varies throughout the year. Two of the three largest breeding colonies in the region are on Sugarloaf Island off Cape Mendocino and on St. George Reef off Crescent City. Because Steller Sea Lions are highly mobile along the coast and their breeding colonies are far from the diffuser, their exposure to the diffuser effluent is likely to be short term.

Harbor Seal — Harbor Seals are widely distributed throughout the northern Atlantic and Pacific Oceans along coastal waters, river mouths, and bays (Burns 2008; Lowry et al. 2008). The Harbor Seals in the PSB represent the eastern North Pacific (ENP) Ocean subspecies, and aside from occasional dispersing individuals, are part of the California population. Harbor Seals breed along the Humboldt County coast and inhabit the area year-round (Sullivan 1980). Humboldt Bay is the largest pupping and haul-out area in the PSB; other haul-out sites are located in Trinidad Bay and at the mouths of the Mad and Eel Rivers (Loughlin 1974; Sullivan 1979, 1980). Harbor Seal abundance in the PSB, and site fidelity to haul-out sites, peaks in summer during pupping and molting, and declines in winter when individuals disperse to seek areas of high prey abundance (Sullivan 1980; Herder 1986; Goley and Harvey 2010). Harbor Seals are highly mobile and forage along the coast and in Humboldt Bay, diving to depths of 1,640-ft (500-m), therefore, their exposure to the diffuser effluent is likely to be short term.

Gray Whale — This species was listed as endangered in 1970 (CDFW 2020). The ENP population was delisted from endangered in 1994, but the western North Pacific (WNP) population is still listed as endangered (CDFW 2020). The entire ENP population of Gray Whales migrates past Humboldt

County twice a year and the PSB includes migration Biologically Important Areas (BIAs); the PSB is within the Gray Whale feeding BIA (Calambokidis et al. 2015). The southbound migration begins as early as October and peaks in January, and the northern migration, generally gray whales with calves migrating close to shore, is from March to May (Sullivan et al. 1983; Rugh et al. 2005; Goley and Harvey 2010; Calambokidis et al. 2015). Some Gray Whales have been observed to remain throughout the summer between northern California and Vancouver Island instead of returning to Alaska. This “Pacific Coast Feeding Group” (PCFG) numbers about 200 whales, many of whom return to these areas between years (Calambokidis et al. 2002). Humboldt County is within the southern end of the PCFG (Calambokidis et al. 2002). In 1998 and 1999, 28 individuals of the PCFG were photo-identified; three individuals were sighted in both years (Toropova 2003). The highest number of sightings occurred at Patrick’s Point and at the mouth of the Klamath River from early June to mid-October. Gray Whales were the second-most numerically abundant cetacean species recorded from nearshore surveys (0.25–3.11 mi [.4–5 km] from shore) conducted from 1989 to 2009 from the Oregon/California border to Shelter Cove, California (USFS 2010). Therefore, Gray Whales are likely to occur in the PSB, particularly during their migrations. Due to the small spatial scale of the effluent plume and the highly migratory behavior of gray whales, their exposure to the diffuser effluent is likely to be short term.

Harbor Porpoise — Harbor Porpoises from Humboldt County are included in the northern California/southern Oregon population that extends from Point Arena to Lincoln City, Oregon (Carretta et al. 2009, 2019b). This species was the most common cetacean observed in low-elevation aerial surveys along the U.S. West Coast, and was mostly observed inshore (up to 100 ft [32 m] depths) (Adams et al. 2014). Harbor Porpoise feeds primarily on fish, from small-schooling to bottom-dwelling species in waters less than 650 ft (200 m) deep (Westgate et al. 1995; Bjorge and Tolley 2008). They may also feed at night in outer continental shelf environments on vertically migrating fish and squid. Along the U.S. West Coast, Harbor Porpoises do not migrate seasonally (Barlow 1988) and they have been observed throughout the year within the PSB at the entrance to and within Humboldt Bay, usually as single individuals but sometimes in groups, with a maximum size of 12 animals (Goetz 1983). Abundance peaks between May and October, and porpoise are most plentiful in Humboldt Bay during the flooding tide. Therefore, this species occurs year-round in the PSB and is likely to be more common from late spring to early fall. Due to their highly mobile foraging behavior along the coast, their exposure to the diffuser effluent is likely to be short term.

Special Status Birds

Marbled Murrelet — Marbled Murrelet was listed in 1992 as threatened under FESA (57 FR 45328) and endangered under CESA. Critical habitat has been revised several times since the first designation in 1996 and the most recent designation was in 2016 (81 FR 51348). In coastal waters from the United States–Canada border south to San Francisco Bay, the areas representing the upper 20th percentile of abundance were along the Strait of Juan de Fuca in Washington, the central Oregon coast, and northern California (Raphael et al. 2014). Although only 2 percent of the population occurs in Washington, Oregon, and California, this area represents 18 percent of the species’ linear coastal range and likely supported far greater murrelet numbers historically (McShane et al. 2004). The PSB is in Conservation Zone 4 (from Shelter Cove, California, north to Coos Bay, Oregon) for Marbled Murrelets (Falxa et al. 2016), and 2017 population estimates for this zone were approximately 8,574 murrelets (CI=6,358–11,155) (McIver et al. 2019).

Marbled Murrelet nest on naturally occurring branch platforms high in old-growth coniferous trees (Nelson 1997). They fly between coastal/ocean foraging areas and inland nesting habitat (Miller et al. 2002). Both nesting and non-nesting adult murrelets fly between the forests and the ocean; non-nesting murrelets fly inland, presumably to locate and claim nest sites and establish pair bonds for future nesting, while nesting murrelets fly inland to attend to nests (e.g., switch incubation duties with the partner) and feed chicks (Naslund 1993; Hébert and Golightly 2006). At-sea abundance has been strongly correlated with proximity to inland areas containing contiguous old-growth forest with suitable nesting habitat (Raphael et al. 2016). In California, the at-sea density of Marbled Murrelets during the breeding season is highest (five to more than 10 murrelets per 0.39 mi^2 [1 km^2]) in the nearshore waters between Trinidad, California, and Brookings, Oregon (Falxa et al. 2016), which is directly offshore from large tracts of inland nesting habitat. At sea, Marbled Murrelets forage on small schooling fishes and large pelagic crustaceans (euphausiids, mysids, amphipods) and occur primarily in very nearshore waters (less than 0.9 mi [1.5 km] from shore) (Hébert and Golightly 2008, Raphael et al. 2014, Falxa et al. 2016) but offshore as far as 2.9 km (Raphael et al. 2016). Peak densities of Marbled Murrelets in northern California occur within 1 mi (1.6 km) of shore, and they are rare but consistently present beyond 2.5 mi (4 km) from shore (Hébert and Golightly 2008, Falxa et al. 2016). Marbled Murrelet typically feed on the coast within 25 km of their nesting habitat (Hébert and Golightly 2008). Due to their foraging behavior, which is concentrated typically inshore of the diffuser effluent and within 25 km of their nesting habitat (e.g., Redwood State and National Park), Headwaters Forest Reserve), their exposure to the discharge effluent is likely to be short term.

Special Status Fish

Green Sturgeon (Southern DPS) — NMFS listed the southern DPS of North American Green Sturgeon (*Acipenser medirostris*) as threatened in 2006 (71 FR 17757). This DPS is defined as Green Sturgeon that originate from the Sacramento River basin and from coastal rivers south of the Eel River in California. The Green Sturgeon is a long-lived (up to 70 years), anadromous fish species that occurs along the Eastern Pacific Coast from the Bering Sea south to Ensenada, Mexico, although their consistently inhabited range is much smaller, primarily concentrating in the coastal waters of California, Washington, Oregon, and Vancouver Island (NMFS 2015). They are highly migratory while in the ocean, and spend most of their lives in coastal marine waters, coastal bays, and estuaries along the Pacific coast, including Humboldt Bay (Lindley et al. 2011). This species is present in the PSB and designated critical habitat includes the PSB and offshore to the 328-ft (100-m) isobaths (74 FR 52300). Because adult Green Sturgeon are highly mobile along the coast and bays, their exposure to the diffuser effluent is likely to be short term.

Southern Oregon/Northern California Coast Coho Salmon ESU — Coho Salmon (*Oncorhynchus kisutch*) are a widespread Pacific salmon species that inhabit most major river basins in Northern California. Coho Salmon typically exhibit a 3-year life history, divided between 18 months in freshwater and 18 months in saltwater phases. In freshwater, Coho Salmon spawn and rear in small streams with stable gravels and complex habitat features, such as backwater pools, beaver dams, and side channels. As young juveniles, Coho Salmon pass through estuaries to nearshore areas, where they grow rapidly feeding on small fish and marine invertebrates before moving into the open ocean (Schabetsberger et al. 2003). In ocean waters, juvenile and adult Coho Salmon feed on pelagic fish and invertebrates, such as Pacific Herring, Pacific Sardine, Northern

Anchovy, Pacific Sand Lance, squid, smelt, groundfish, and crab megalopae (PFMC 2000). Marine survival and growth of Coho Salmon are linked to food availability, environmental conditions, and stressors present in the nearshore environment. Adult Coho Salmon spawn and juveniles rear in tributaries to Humboldt Bay, and as juveniles occur in Humboldt Bay for an average duration of 15–22 days on their seaward migration to the open ocean (Pinnix et al. 2012). Because Coho Salmon are highly mobile in marine coastal habitats and migrate through Humboldt Bay. Their exposure to the diffuser effluent is likely to be short term in the Pacific Ocean, and no exposure would result in Humboldt Bay as a result from the distance and associated dilution from the diffusers.

California Coast Chinook Salmon ESU — The California Coastal ESU, which includes all Chinook Salmon naturally reproduced in streams between Redwood Creek in Humboldt County, California, Mouth to the Russian River, Sonoma County, was federally listed as threatened in 1999 (64 FR 50394). Critical habitat was designated in 2005 and consists of river reaches from Redwood Creek to the Russian River (70 FR 52488). Critical habitat does not extend into the open ocean and does not include the PSB. The California Coastal ESU includes 15 independent populations of fall-run and 6 independent populations of spring-run Chinook Salmon (NMFS 2011a). Chinook Salmon from this ESU are known to spawn in the Eel and Mad rivers and in tributaries of Humboldt Bay (NMFS 2011a). Therefore, they would likely occur in the PSB and Humboldt Bay as they migrate to freshwater tributaries as adults to spawn, and as juveniles on their seaward migration to the ocean. They are an “ocean-type” race (i.e., they migrate to the ocean soon after hatching) and would therefore be expected to remain near the coast of California and Oregon during their ocean phase. Juvenile Chinook Salmon from southern Oregon and northern California were more abundant south of Cape Blanco to northern California during surveys conducted in the summer, which also suggests that they do not migrate north during their ocean phase (Brodeur et al. 2004). In the ocean, juvenile salmonids are pelagic and typically surface-oriented, most often found in the upper 20 m of the water column (Emmett et al. 2004, Walker et al. 2007 Beamish et al. 2000). Their preferred prey types are also pelagic (e.g., Copepods, Euphausiids [*Euphausia pacifica* and *Thysanoessa spinifera*], and juveniles of Northern Anchovy [*Engraulis mordax*], Pacific Herring [*Clupea pallasii*], sardines [*Sardinops sagax*], rockfishes [*Sebastes* spp.], and smelt [Osmeridae]; Brodeur et al. 2005, Brodeur et al. 2007, Daly et al. 2009, Santora et al. 2012). Adult salmonids, especially Chinook Salmon, occur at greater depths than juveniles, as evidenced by their capture as bycatch in midwater trawl fisheries (Lomeli and Wakefield 2014). Their prey is predominately pelagic; based on stomach samples collected from adult Chinook Salmon (≥56 cm in length) caught in coastal waters off Northern California coastal waters, frequently encountered prey items included Euphausiids, Northern Anchovy, Squid (*Loligo opalescens*), Pacific Herring, Pacific Sandlance, Surf Smelt (*Hypomesus pretiosus*), Night Smelt (*Spirinchus starksi*), and Dungeness Crab Megalopae (Hunt et al. 1999).

Risks to the ESU include degradation of freshwater habitats from agricultural and forestry practices, water diversions, urbanization, mining, and severe recent flood events (exacerbated by land use practices). Many of these factors are particularly acute in the southern portion of the ESU (NMFS 2011a). The Final Coastal Multispecies Recovery Plan (NMFS 2016) does not recommend recovery actions in coastal habitats other than for fishing and collecting activities; most of the recovery actions address activities in watersheds and estuaries. Because Chinook Salmon are highly mobile, their exposure to the diffuser effluent is likely to be short term in the Pacific Ocean. No exposure

would result in Humboldt Bay as a result from the distance and associated dilution from the diffusers.

Northern California Steelhead DPS — This DPS was federally listed as threatened in 2000 and includes all naturally spawned steelhead populations below natural and manmade impassable barriers in coastal rivers, from Redwood Creek in Humboldt County, California, south to, but not including, the Russian River (65 FR 36074). Northern California Steelhead are known to spawn and rear in tributaries of Humboldt Bay, and therefore migrate through Humboldt Bay on their seaward migration to the ocean as juveniles, and as adults on their migration to spawning tributaries. Critical habitat was designated in 2005 and consists of river reaches between Redwood Creek south to Point Arena on the Mendocino coast (70 FR 52488). Critical habitat does not extend out into the open ocean and does not include the PSB. This DPS contains both winter and summer steelhead populations. After reaching the ocean in the spring, juvenile steelhead tend to move offshore quickly rather than use nearshore waters like other salmon. For example, Daly et al. (2014) captured tagged juvenile steelhead that migrated greater than 55km offshore of the Columbia River within 3 days.

The current status of the populations within this DPS are uncertain. Threats include habitat degradation and loss from urban development, logging, roads, agriculture, mining and recreation, water withdrawals and diversions, and barriers to fish passage (NMFS 2011b). The Final Coastal Multispecies Recovery Plan (NMFS 2016) provides recovery actions that address activities in watersheds and estuaries only. Steelhead, of all of the salmonids, are the least likely to remain in coastal waters (Beamish et al. 2005). Their exposure to the diffuser effluent is likely to be short term in the Pacific Ocean, and no exposure would result in Humboldt Bay as a result from the distance and associated dilution from the diffusers.

Pacific Lamprey — Pacific Lamprey spawn and rear in freshwater habitats including tributaries to Humboldt Bay, the Eel and Mad rivers. Pacific Lamprey in the marine environment are parasitic and dependent on their hosts including numerous fish species, however it is not known to what extent they change hosts, kill their hosts, or switch hosts (Clemens et al 2019). Because their hosts are likely to be highly mobile, particularly relative to the PSB, Pacific Lamprey are assumed to be in the PSB only briefly and their exposure to diffuser effluent would be short term.

5.3. Non-Special Status Marine Species

Marine species of commercial and recreational interest with potential to occur in the Project Area have been summarized in **Table 5.2**

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Table 5.2 Non- Special Status Marine Species of Commercial and Recreational Interest with Potential to Occur in the Project Area

Scientific Name	Common Name	Habitat Requirements	Potential to Occur in the Project Area and PSB
Fish			
Families: Sebastidae, Scorpaenidae	Rockfish, Rockcod	Marine and Bay	**High Potential.** Occurs on coastal and bay soft bottom and rocky reef habitats.
Platichthys stellatus	Starry Flounder	Marine and Bay	**High Potential.** Occurs on coastal and bay soft bottom substrates.
Mustelus henlei	Sand Shark or Smoothhound Shark	Marine and Bay	**Moderate Potential.** More common in bays than offshore but highly motile.
Ophiodon elongatus	Lingcod	Marine and Bay	**Moderate Potential.** Typically occupies rocky reef habitat but may occupy artificial hard substrates such as the diffuser pipe.
Family: Osmeridae. Hypomesus pretiosus, Spirinchus starksi	Smelt (surf or day smelt, night smelt)	Marine and Bay	**High Potential.** Commonly found in trawl surveys in the vicinity of the diffuser pipe, and captured by recreational and commercial fishers in the surf zone.
Psettichthys melanostictus	Pacific Sand Sole	Marine	**High Potential.** Commonly found in trawl surveys in the vicinity of the diffuser pipe, along with several other species of flatfish.
Amphistichus rhodoterus	Redtail Surfperch	Marine and Bay	**High Potential.** Tends to occur inshore of the diffuser pipe, captured by recreational surf fishers.
Invertebrates			
Metacarcinus magister	Dungeness Crab	Marine and Bay	**High Potential.** Supports locally important commercial and recreational fisheries.

Scientific Name	Common Name	Habitat Requirements	Potential to Occur in the Project Area and PSB
Family Cancridae (Cancer productus, Metacarcinus anthonyi, Romaleon antennarium	Rock Crab (e.g., Red Crab, Yellow Crab, and Brown Crab)	Marine and Bay	**Moderate Potential.** Tends to occur on rocky reefs and in kelp beds and the soft bottom interface with rocky reef habitat, but may use artificial hard substrates such as the outfall pipe.
Siliqua patula	Razor Clam	Marine, Open Sandy Beaches	**High Potential.** Juveniles found in infauna surveys in the vicinity of the diffuser pipe.
Tressus spp.	Horseneck Clam or Gaper Clam	Mostly Bay	**Low Potential.** Occurs mostly in Humboldt Bay.
Clinocardium nuttellii	Cockles	Bay	**Low Potential.** Occurs mostly in Humboldt Bay.
Octopus spp.	Octopus	Marine and Bay	**Moderate Potential.** Octopus occur on rocky substrate, associated with kelp, and in soft bottom habitats.
Pisaster spp.	Starfish or Sea Star	Marine and Bay	**Moderate Potential.** Short spined starfish have been captured in trawl surveys in the vicinity of the diffuser pipe.
Pandalus spp.	Prawns	Marine	**Moderate Potential.** Prawns and other decapods have been captured in trawl surveys in low numbers in the vicinity of the diffuser pipe, but typically occur at greater depths.

5.3.1. Non-Special Status Species Descriptions

Fish and invertebrate species that are not listed as threatened or endangered or as a species of concern, but are managed by CDFW for capture for human consumption, or are otherwise of local concern or interest are addressed below.

Fish

Starry Flounder — Starry Flounder is a demersal species found in coastal marine and bay habitats, supporting both commercial and recreational fisheries off Humboldt. They range from Alaska to Southern California and they prefer soft bottom habitats (Haugen and Thomas 2001); they are relatively common in Humboldt Bay (Barnhart et al. 1992), and have been found in low numbers in trawl surveys in the vicinity of the diffuser outfall (Pequegnat et al. 1995). They occur to depths of 900 feet but are most common in shallower waters (Haugen and Thomas 2001). Starry Flounder are likely to occur in the PSB, however they are reasonably motile (alongshore and on-offshore movements) so their exposure to diffuser effluent would likely be short term, resulting in a very low risk of adverse effects to the Starry Flounder in proximity to the diffuser.

Pacific Sand Sole — Pacific Sand Sole is a demersal species found on soft bottom shelf habitats out to depths of 325 m, but most common at depths less than 150 m (PFMC 2019). They have been captured in trawl surveys in the vicinity of the diffuser pipe (Peguegnat et al. 1995). Pacific Sand Sole are likely to occur in the PSB, adults are relatively motile, they may move into shallow nearshore waters in early winter to spawn, then move south and offshore in the summer to feed (PFMC 2019), and therefore their exposure to diffuser effluent would likely be short term, resulting in a very low risk of adverse effects to the Pacific Sand Sole in proximity to the diffuser.

Rockfish/Rockcod — Rockfish likely to occur in the PSB include Black Rockfish (*Sebastes melanops*), Blue Rockfish (*S. mystinus*), Bocaccio (*S. paucispinis*), China Rockfish (*S. nebulosus*), Copper Rockfish (*S. caurinus*), and Quillback Rockfish (*S. maliger*). Most of these species prefer hard rocky reef habitat, however, younger life stages (larvae) are pelagic and juveniles often settle on soft bottom habitat before moving to preferred reef habitats (Love et al. 2002). Although not considered migratory, Rockfish can have relatively extensive movements (Love et al. 2002). The diffuser pipe may act as an "artificial reef" that attracts Rockfish but is relatively small and may only support low numbers of Rockfish in comparison to a more extensive reef system; therefore, because the effects of the discharge are also limited spatially, it is anticipated that there is only a very low risk of adverse effects to Rockfish.

Lingcod — Lingcod range from Baja California to Alaska, and occur in both hard and soft bottom habitats along the north coast of California. Lingcod are important to recreational and commercial fishers, and although not migratory are moderately motile (Adams and Starr 1991). Lingcod tend to prefer hard bottom rocky reef habitat, so the diffuser pipe may act as an "artificial reef" that attracts adults. Because it is a relatively small structure it may only support low numbers of Lingcod, in comparison to a more extensive reef system. Therefore, because the effects of the discharge are also limited spatially, it is anticipated that there is only a very low risk of adverse effects to Lingcod.

Smelt — Night and Surf Smelt are important pelagic forage fish that support commercial and recreational fishing from the surf zone along the Humboldt County coast. Adult Night Smelt, and larval/juvenile Smelt species are locally abundant and dominate the fish catch numerically and in

biomass from local trawl surveys conducted in the vicinity of the project site (Pequegnat et al. 1995). Night Smelt aggregate annually nearshore to spawn on coastal beaches in California as early as January and through September (Sweetnam et al. 2001, CDFW 2019a). The effects of the discharge from the diffuser pipe do not result in significant impacts to coastal habitat based on limited spatial area and organic loading, and are anticipated to result in a very low risk of adverse effects to the Smelt in proximity to the diffuser.

Surfperch — There are several species of surfperch (Family Embiotocidae) off Humboldt County and in Humboldt Bay, but the Redtail Surfperch support commercial and recreational fisheries. As named, members of the Surfperch family are typically found in coastal surf-zone habitats but also in Humboldt Bay, and they have been captured in trawl surveys in the vicinity of the diffuser pipe (Pequegnat et al. 1995, CDFW 2019b). Movements of Redtail Surfperch of up to 20 km have been observed (Succow 2017). Redtail surfperch tend to occur inshore of the PSB, and are reasonably mobile; therefore, there exposure to effluent from the outfall would likely be short term, resulting in a very low risk of adverse effects to the Surfperch in proximity to the diffuser.

Sand Shark — Sand Shark (or Brown Smoothhound Shark), range from Oregon to Baja California and are most common in sandy or muddy bottom habitats of Humboldt Bay, and also in deeper water on the continental shelf. (CDFW 2019c). They occur in Humboldt Bay most of the year and appear to move offshore during the winter months, potentially to avoid the colder, low salinity water (CDFW 2019c). Because they are mobile and mostly within Humboldt Bay, their exposure to the discharge pipe effluent is likely to be short term , resulting in a very low risk of adverse effects to the Sand Shark in proximity to the diffuser.

Invertebrates

Dungeness Crab — Dungeness Crab support an important local commercial fishery that had the highest value of all fished species landed in Eureka, Trinidad, and Crescent City in 2019 (CDFW 2020). Dungeness Crab also support a local recreational fishery. Their distribution ranges from Alaska to Point Conception, California, and because of their wide range, commercial value, and high motility, California, Oregon, and Washington coordinate on interstate management issues through the Tri-State Dungeness Crab Committee, which is overseen by the Pacific States Marine Fisheries Commission (Juhasz and Kalvass 2013). Dungeness Crab are benthic crustaceans residing on sandy to sand-mud substrate of bays, estuaries and the open coast, and are most abundant at depths less than 300 feet (91 m) but can be found as deep as 750 feet (230 meters); juveniles tend to prefer eelgrass habitat in bays and estuaries (Juhasz and Kalvass 2013). Dungeness Crab are likely to be in the PSB, however, because they are highly motile, their exposure to diffuser effluent would likely be short term, resulting in a very low risk of adverse effects to the Dungeness Crab in proximity to the diffuser.

Rock Crabs — Three species of Rock Crab make up this complex that supports commercial and recreational fisheries: Red Rock Crab (*Cancer productus),* Yellow Rock Crab *(Metacarcinus anthonyi),* and Brown Rock Crab *(Romaleon antennarium)* (CDFW 2019d). All three species of Rock Crab inhabit the intertidal area out to depths greater than 325 feet, but Brown and Red Rock Crab prefer rocky or reef-type habitat, whereas Yellow Rock Crab habitat includes silty sand to mud substrates and sand-rock substrate of rocky reef (CDFW 2019d). Brown Rock Crab inhabit substrates of rocky shores subtidal reefs and coarse to silty sands and are more abundant at

depths less than 180 feet (CDFW 2019d). Movements of Rock Crabs are limited, studies suggest movements are on the order of a few miles maximum (CDFW 2019d). The diffuser pipe may act as an "artificial reef" that attracts Rock Crabs but it is relatively small in size and may only support low numbers of Rock Crabs in comparison to a more extensive reef system; therefore, because the effects of the discharge are also spatially limited, it is anticipated that there is a very low risk of adverse effects to Rock Crabs.

Razor Clam — Razor Clam is a shallow water intertidal and shallow subtidal species supporting a popular recreational fishery in northern California but ranges from Alaska to Pismo Beach, CA (Moore 2001a). Although fished primarily along open coast sandy beaches during extreme low tides, juvenile Razor Clams have been captured in trawls taken in the vicinity of the outfall pipe (Pequegnat et al. 1995). Apparently incapable of voluntary horizontal movement, Razor Clams are capable of burrowing vertically extremely fast (Moore 2001a). Razor Clams in the PSB are likely to be exposed to the discharge due to their poor horizontal mobility; therefore, there could be potential effects to these relatively low mobility clams in the vicinity of the outfall. However, the spatial extent of the effluent plume, rapid diffusion, and limited spatial extent of organic matter sedimentation will make any effects to the population extremely limited, resulting in a low risk of adverse effects to the Razor Clams in proximity to the diffuser.

Gaper Clam — Gaper Clams support recreational fisheries in Humboldt Bay, their distribution is limited to bay and sheltered open coast habitats with fine sand or mud bottoms (Moore 2001b). Because it is unlikely that Gape Clams would be on the open coast in PSB, there is no risk of exposure to effluent from the outfall.

Cockles — Similar to Gaper Clams, Cockles inhabit intertidal and shallow subtidal sediments of protected shores, and they support recreational fisheries in Humboldt Bay. They are unlikely to occur along the open coast or the PSB; and therefore no risk of exposure from the effluent is expected.

Octopus — There is little information about Octopus in the region, however, Giant Pacific Octopus (*Enteroctopus dofleini)* and Red Octopus *(Octopus rubescens)* do occur in nearshore and offshore habitats in the region, including soft bottom habitats (Lauermann et al. 2017). Octopus are caught in both commercial and recreational fisheries, and are thought to be relatively sedentary in rocky reef habitat, although they have been observed on soft bottom habitats away from rocky reefs (Lauermann et al. 2017). The diffuser pipe may act as an "artificial reef" that attracts Octopus but it is relatively small in size and may only support low numbers of Octopus in comparison to a more extensive reef system; therefore, because the effects of the discharge are also spatially limited, it is anticipated that there is a very low risk of adverse effects to Octopus.

Sea Stars — Sea Stars or Starfish, in particular two species Brown Mud Star (*Luidia foliolata*) and Short-Spined Star (*Pisaster brevispinus*), occur in the PSB, based on captures in trawl surveys conducted in the vicinity of the outfall (Pequegnat et al. 1995) and species-habitat relationships (Hemery et al. 2016). Sea Star Wasting Disease affected Sea Stars along the entire west coast, and was likely due to extremely high water temperatures (Miner et al. 2018). Sea Stars have low mobility once settled to the sea floor, and therefore those in the PSB may be affected by the effluent in the vicinity of the outfall. However, it is expected that the very limited spatial extent of benthic

effects associated with the outfall discharge would have a very low risk of adverse effects to Sea Stars.

Prawns/Shrimp — Prawns/Shrimp off Humboldt include Spot Prawns (*Pandalus platyceros*) and Ocean Pink Shrimp (*Pandalus jordani*). These species range from Alaska to San Diego and captured in commercial and recreational fisheries off Humboldt (Pomeroy et al. 2011). These species are typically found in waters deeper than the PSB, usually in muddy substrates at 150-1,200 feet but are typically captured between 300-600 feet (CDFW 2019e). They are mobile but their dispersal is thought to occur during larval life stages (CDFW 2019e). Because the PSB is shallower than the main distribution of Prawns/Shrimp, effects of the project are unlikely to have adverse effects due to the limited spatial area of the discharge.

5.4. Critical Habitat

In October 2009, NMFS designated all nearshore waters to a depth of 60 fathoms (360 ft or 110 m) offshore Oregon as critical habitat for the southern DPS of the Green Sturgeon (74 FR 52300). This critical habitat includes the PSB. The primary constituent elements for Green Sturgeon in nearshore coastal marine areas include: 1) Migratory corridor -- A migratory pathway necessary for the safe and timely passage of Southern DPS fish within marine and between estuarine and marine habitats; 2) Water quality -- Nearshore marine waters with adequate dissolved oxygen levels and acceptably low levels of contaminants (e.g., pesticides, organochlorines, elevated levels of heavy metals) that may disrupt the normal behavior, growth, and viability of subadult and adult Green Sturgeon; and 3) Food resources -- Abundant prey items for subadults and adults, which may include benthic invertebrates and fishes. Effects of the project on primary constituent elements of Green Sturgeon critical habitat are not anticipated. The project will use the existing RMT II ocean outfall pipe and multiport diffuser, which would not affect the migratory corridor primary constituent element; changes to water quality, as discussed below in Section 6 and in GHD 20212021, are very limited in spatial extent and should not adversely affect the water quality primary constituent element. Subadult and adult green sturgeon that may encounter the effluent plume are unlikely to be exposed to concentrations considered harmful to the species (lethal concentrations for subadult and adult Green Sturgeon are unknown but the 96 hour LC50 for juvenile Shortnose Sturgeon [*Acipenser brevirostrum*] in freshwater for NH3 is 0.58 mg/L and for NO_X is 11.3 mg/L) or their critical habitat (NMFS 2016), based on disturbance associated with dredging activities in Humboldt Bay and sediment disposal at the Humboldt Open Ocean Disposal Site. Changes to benthic ecosystem productivity would be spatially limited to an area in proximity of the diffuser structure, and should not adversely affect the food resources primary constituent element.

5.5. Essential Fish Habitat

EFH identifies waters and substrates required by fish for spawning, breeding, feeding, and growth to maturity. EFH waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish. For Pacific coast species, EFH is described under four fishery management plans (FMPs) covering groundfish, coastal pelagic species, highly migratory species, and Pacific coast salmon (as detailed in the following sections). The PSB does not include any HAPCs.

Pacific Groundfish—Pacific groundfish represent a large number of resident species along the U.S. West Coast. The northern California coast provides groundfish habitat from the nearshore mean higher high water or the upstream extent of salt water intrusion, to deepwater areas seaward to the boundary of the U.S. Exclusive Economic Zone (EEZ) (PFMC 2006). In 1998, the PFMC made more than 400 EFH designations for 82 groundfish species (PFMC 2006). The PFMC further defined important habitat by species and life stage, species likely to occur in the PSB include flatfishes (e.g., Speckled Sanddab (*Citharichthys stigmaeus*), Pacific Sanddab (*C. sordidas*)), rockfishes (e.g., Black Rockfish (*Sebastes melanops*, Blue Rockfish (*S. mystinus*)), Lingcod (*Ophiodon elongates),* Cabezon *(Scorpaenichthys marmoratus),* and Kelp Greenling *(Hexagrammos decagrammus).* Adults and subadults of some of the Pacific Groundfish reef-oriented species may be attracted to the RMT ocean outfall structure and therefore may spend more time in the area of higher contaminant concentration (Lowe and Bray 2006), although this is an extremely small area in comparison to the vast amount of open ocean and benthic habitat available in coastal waters off Humboldt Bay. Additionally, younger pelagic life stages are likely more susceptible to effects of effluent contaminants and degraded water quality due to their incomplete physiological development, although specific levels affecting younger life stages are not known (NMFS 2020c). It is anticipated that dilution of effluent at the RMT outfall would be rapid and exposure to levels that may be toxic to pelagic life stages is not expected. The effects of the discharge do not result in significant benthic or pelagic impacts based on limited spatial area and organic loading, resulting in a low risk of adverse effects to the groundfish EFH in proximity to the diffuser (See Section 6, and GHD 20212021); implementing monitoring and compliance as required by the NPDES permit will confirm the proposed action is not resulting adverse effects on groundfish EFH.

Highly Migratory Species—Highly migratory species are pelagic fish species such as tunas, marlins, and sharks that occur worldwide and are highly mobile. They can be found in both the EEZ region out to 230 mi (370 km) from shore and the high seas (PFMC 2007). Pelagic fish off the northern California coast with EFH in the PSB include the common Thresher Shark (*Alopias vulpinus*) and Bigeye Thresher Shark (*Alopias superciliosus*). Reproduction of common thresher shark occurs considerably farther south of the PSB, pups are known to come into shallow waters and bays, and adults are generally found farther offshore in 1,197–1,798 ft (365–548 m) depths (PFMC 2007). Similarly, adult bigeye thresher shark are found in deeper waters off northern California (PFMC 2007), as are Albacore Tuna (*Thunnus alalunga*), Northern Bluefin Tuna (*Thunnus orientalis*), and Broadbill Swordfish (*Xiphias gladius*) (NMFS 2009a). Adult Albacore Tuna and juvenile Northern Bluefin Tuna generally occur beyond the 100-fathom (fm) (183 m) isobaths, which makes them likely to occur within the PSB (PFMC 2007). Likewise, juvenile and adult broadbill Swordfish tend to be offshore of the 1,000-fm (1,830-m) isobath, and are therefore unlikely to be in the PSB (PFMC 2007).

Coastal Pelagic Species—Coastal pelagic species live in the water column, and are generally found anywhere from the surface to 3,281 ft (1,000 m) deep. Coastal pelagic species that may occur in offshore waters along the northern California coast, and in the PSB, include six species/species groups that are actively managed: Northern Anchovy (*Engraulis mordax*), Pacific Sardine (*Sardinops sagax*), Pacific Mackerel (*Scomber japonicus*), Jack Mackerel (*Trachurus symmetricus*), California Market Squid (*Loligo opalescens*), and krill (PFMC 2008a). The geographic ranges of these species vary seasonally in response to changes in sea surface temperatures

(PFMC 2008b). They prefer sea surface temperatures between 50–78°F that usually occur above the thermocline. Sardine and mackerels can be seasonally more abundant in the northern California region during the summer months and El Niño warm water years (PFMC 2008a). Mackerel spawn from Eureka to Cabo San Lucas, Mexico, peaking between April and July when enough plankton, euphausids, squid, or small fish are available and the environmental conditions are favorable (PFMC 1998). The EFH for these species is marine and estuarine waters along the coast of northern California and offshore to the EEZ boundary line. Pacific mackerel, jack mackerel, and northern anchovy have been documented in or near the PSB. Harvest of all species of krill is prohibited in the West Coast EEZ and is intended to ensure fisheries will not develop that could put at risk krill stocks and the other living marine resources that depend on krill (PFMC 2019). The project will use the existing RMT II ocean outfall pipe and multiport diffuser structure, and the effects of the discharge do not result in significant impacts to coastal habitat based on limited spatial area and organic loading, resulting in a low risk of adverse effects to the Coastal Pelagic Species EFH in proximity to the diffuser (See Section 6, and GHD 2021).

Pacific Coast Salmon—EFH for Chinook and Coho Salmon includes rivers and coastal streams from central California to Alaska and oceanic waters along the United States and Canadian coasts and seaward to the north central Pacific Ocean and the high seas (PFMC 2000). The marine environment covers an extensive area and has not been well sampled. Therefore, EFH for salmon in the ocean cannot be precisely defined. Adult and juvenile Coho and Chinook Salmon forage in nearshore and offshore areas, often near shelf habitat where upwelling creates the proper temperatures and conditions for food resource production (PFMC 2000). Chinook and Coho Salmon are most concentrated inshore of 37 mi (60 km) along the continental shelf of Washington, Oregon, and California while Chinook salmon have been recorded from high-seas fisheries and tagging studies that also show their presence outside the continental shelf (PFMC 2014). The project will use the existing RMT II ocean outfall pipe and multiport diffuser structure, and the effects of the discharge do not result in significant impacts to pelagic habitat based on limited spatial area and organic loading, resulting in a low risk of adverse effects to the Pacific Coast Salmon EFH in proximity to the diffuser (See Section 6, and GHD 2021).

6. Summary of Potential Impacts and Avoidance and Minimization Measures

Potential effects of the diffuser effluent could result from changes to water quality, including temperature, salinity, nutrients (ammonia, reduced and oxidized inorganic nitrogen, orthophosphate), and sedimentation of organic particles on the seabed (GHD 2021). Because the diffuser ports discharge at a 45 degree vertical angle relative to the seabed, no seabed disturbance or increases in turbidity or suspended sediment would result from the discharge. Ammonia and nitrite can be toxic at high enough concentrations, and nitrate and phosphates, depending on concentrations, can enrich receiving water and cause eutrophication (Dauda et al. 2019). However, the modelled toxicity mixing zone is extremely limited to within less than 5 ft of the multiport diffuser due to rapid dilution (GHD 2021), indicating that marine organisms would need to be in the immediate zone of the diffuser in order to be exposed to potentially toxic levels of ammonia. Additionally, the NH_3 effluent concentration (0.004 mg/L) of the future NAFC aquaculture facility will

be substantially lower than the numeric water quality objective (0.6 mg/L) in Table 4.1 and in fact will dilute higher NH_3 concentrations from the future Samoa STP. It is therefore unlikely that any of the marine resources of concern, which are for the most part all highly mobile, would be exposed to potentially toxic levels of effluent.

The modelled zone of potential water quality degradation (e.g., nutrient enrichment) is seasonally dependent and significantly larger in area than the toxicity mixing zone, as described in GHD 2021. Statistical contours for the dilution target of 200 (zone of potential water quality degradation) at the surface (0-2 m), mid-water column (2-16 m) and near-seabed (>16 m) for the representative summer scenario was modelled (GHD 2021). Because the comingled discharge (~27 psu) is less saline than the ambient seawater (~33.5 psu) and the ambient salinity stratification is weak, the plume has a greater tendency to rise to the surface as it undergoes dilution than detraining in the middle of the water column. Further, the zone of potential water quality degradation (i.e., elevated nutrients) near the seabed is much smaller than the areal extent of the surface and mid-water column, so that the risk of enhanced benthic productivity is low. The risk of increase in domoic-acid producing diatoms is also very low, the production of domoic acid is associated with large-scale events, such as the marine heat wave that resulted in a sustained bloom of toxic diatoms that led to persistent domoic acid that delayed the Dungeness Crab fishery (Santora et al. 2020).

The zone of potential water quality degradation in the surface waters (upper 2 m) for 99%, 95%, 90% and 80% of the time that extends up to ~1 km, ~500 m, ~400 m and ~300 m from the diffuser, respectively. However, the 50th percentile contour only occurs in the immediate locale of the diffuser. The spatial extent of the zone of potential water quality degradation in the mid-water column (2-16 m) is similar, but smaller in spatial extent. Because the currents are constantly transporting surface and mid-depth waters through this area, the duration that pelagic (in water) organisms experience elevated nutrients is limited (minutes). Hence, a ‘negligible’ material increase in pelagic ecosystem productivity under such conditions is predicted, and the risk of deleterious water quality impacts to the surface and mid-water column waters are ‘very low’.

The zone of potential water quality degradation in the lower portion of the water column (>16 m) for 99% and 95% of the time extends up to ~50 m and ~25 m from the diffuser, respectively. Dilution of the comingled discharge with the ambient marine waters in the lower water column was always greater than 200 for at least 90% of the time (i.e., no 10th percentile exceedance contour in the plot). The combination of the limited spatial extent and relatively brief duration that the proximal benthic habitat would experience elevated nutrients indicates a ‘very low’ risk of increased benthic ecosystem productivity.

However, in winter, due to strong salinity stratification, as the plume rises through the water column and entrains ambient seawater in the lower to mid-portions of the water column (~33 psu), the plume attains a salinity (through entrainment of ambient waters) that is greater than the surface waters (26-32 psu). At this point, the plume is no longer positively buoyant, no longer rises in the water column, and it detrains into the mid-water column below reaching the surface. Hence, dilution in the surface waters (0-2 m) is greater than 200 for at least 99% of the time. In contrast, the detrainment of the plume into the mid-water column (2-16 m) yields a zone of potential water quality degradation for 99%, 95%, 90% and 80% of the time that extends up to ~1 km, ~200 m, ~100 m and ~50 m from the diffuser, respectively. However, the 50th percentile contour only occurs in the immediate locale of the diffuser. The spatial extent of the zone of potential water quality degradation

in the near-seabed waters (>16 m) yields a zone of potential water quality degradation for 99%, 95%, 90% and 80% of the time that extends up to ~450 m, ~200 m, ~150 m and ~100 m from the diffuser, respectively. In winter, salinity stratification increases the spatial extent and duration that the proximal benthic habitat would experience elevated nutrients and thereby the potential for some increased benthic ecosystem productivity.

The simulated zone of potential benthic impacts was affected by particle settling velocity, with 3 different particle settling velocities modelled for winter and summer seasons (GHD 2021). The simulated zone of potential impacts for both summer and winter simulations ranged from 25 to 500 m depending on settling rate, but do not result in significant benthic impacts based on spatial area and organic loading, resulting in a low risk of impact to the benthic community in proximity to the diffuser (GHD 2021).

Due to the modelled localized, limited spatial extent of the toxicity mixing zone, zone of potential water quality degradation, and zone of potential benthic impacts, and the short temporal duration of exposure to highly mobile marine organisms of concern, it is unlikely for the effluent to have any direct adverse effects on marine resources of concern, including protected cetaceans and pinnipeds, Marbled Murrelet, salmonids and Green Sturgeon or on designated critical habitat for Green Sturgeon, essential fish habitat, or non-special status commercial and recreational fisheries. Similarly, it is unlikely for the effluent to have any direct or indirect adverse effects on marine biological resources such as Dungeness Crab, and other commercially and recreationally important fish species such as night smelt and other species of nearshore fish. There could be potential indirect effects to benthic organisms with limited mobility and immobile benthic prey species of marine species of concern, (e.g., polychaetes) associated with sedimentation of organic matter, but the limited spatial extent of potential benthic impacts, and high mobility of marine resources of concern, make any potential indirect effects less than significant.

6.1. Proposed Avoidance and Minimization Measures

Given no impacts to marine resources are expected as a result of the Project's discharge via the RMT II ocean outfall, as modeled by GHD (2020), no avoidance or minimization measures for marine resources are proposed.

7. Conclusion

Five special status or protected mammal species, one special status bird species, five special status fish, and Essential Fish Habitat may occur in the PSB. Due to the small spatial scale and likely short-term exposure of these marine species to the effluent plume, impacts are considered to be less than significant. In addition, impacts to commercial and recreational species, as well as invertebrate communities that support commercial and recreational species, are also considered to be less than significant. The Project will implement monitoring as required in NPDES permit and any potential future deviations from water quality thresholds established in the permit will require reconciliation with the North Coast Regional Water Quality Control Board and regulatory provisions of other resource agencies. More specific measures may be identified in subsequent environmental review and permit applications.

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10. Appendices

Appendix A – CNDDB, IPaC, and NMFS Database Search Results

NMFS EFH Mapper

Query Results

Degrees, Minutes, Seconds: Latitude = 40º50'49" N, Longitude = 125º44'17" W
Decimal Degrees: Latitude = 40.85, Longitude = -124.26

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

EFH

Show	Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
			Finfish	ALL	Pacific	
			Krill - Thysanoessa Spinifera	ALL	Pacific	
			Krill - Euphausia Pacifica	ALL	Pacific	
			Other Krill Species	ALL	Pacific	
			Coastal Pelagic Species	ALL	Pacific	
			Groundfish	ALL	Pacific	Groundfish

HAPCs

No Habitat Areas of Particular Concern (HAPC) were identified at the report location.

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

Pacific Coastal Pelagic Species,
Jack Mackerel,
Pacific (Chub) Mackerel,
Pacific Sardine,
Northern Anchovy - Central Subpopulation,
Northern Anchovy - Northern Subpopulation,
Pacific Highly Migratory Species,
Bigeye Thresher Shark - North Pacific,
Bluefin Tuna - Pacific,
Dolphinfish (Dorado or Mahimahi) - Pacific,
Pelagic Thresher Shark - North Pacific,
Swordfish - North Pacific,
West Coast Salmon,
All species and stocks

NOAA Fisheries West Coast Region California Species List Tools

Quad Name **Eureka**
Quad Number **40124-G2**

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

ESA Whales

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

ESA Pinnipeds

Guadalupe Fur Seal (T) -
Steller Sea Lion Critical Habitat -

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 - X
MMPA Pinnipeds - X

California Natural Diversity Data Base

Entosphenus tridentatus — **Element Code:** AFBAA02100
Pacific lamprey

Listing Status:	**Federal:**	None	**CNDDB Element Ranks:**	**Global:**	G4
	State:	None		**State:**	S4
	Other:	AFS_VU-Vulnerable, BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, USFS_S-Sensitive			
Habitat:	**General:**	FOUND IN PACIFIC COAST STREAMS NORTH OF SAN LUIS OBISPO COUNTY, HOWEVER REGULAR RUNS IN SANTA CLARA RIVER. SIZE OF RUNS IS DECLINING.			
	Micro:	SWIFT-CURRENT GRAVEL-BOTTOMED AREAS FOR SPAWNING WITH WATER TEMPS BETWEEN 12-18 C. AMMOCOETES NEED SOFT SAND OR MUD.			

Acipenser medirostris — **Element Code:** AFCAA01030
green sturgeon

Listing Status:	**Federal:**	Threatened	**CNDDB Element Ranks:**	**Global:**	G3
	State:	None		**State:**	S2
	Other:	AFS_VU-Vulnerable, CDFW_SSC-Species of Special Concern, IUCN_NT-Near Threatened, NMFS_SC-Species of Concern			
Habitat:	**General:**	THESE ARE THE MOST MARINE SPECIES OF STURGEON. ABUNDANCE INCREASES NORTHWARD OF POINT CONCEPTION. SPAWNS IN THE SACRAMENTO, KLAMATH, & TRINITY RIVERS.			
	Micro:	SPAWNS AT TEMPS BETWEEN 8-14 C. PREFERRED SPAWNING SUBSTRATE IS LARGE COBBLE, BUT CAN RANGE FROM CLEAN SAND TO BEDROCK.			

Oncorhynchus kisutch pop. 2 — **Element Code:** AFCHA02032
coho salmon - southern Oregon / northern California ESU

Listing Status:	**Federal:**	Threatened	**CNDDB Element Ranks:**	**Global:**	G4T2Q
	State:	Threatened		**State:**	S2
	Other:	AFS_TH-Threatened			

Oncorhynchus clarkii clarkii **Element Code:** AFCHA0208A

coast cutthroat trout

Listing Status:	**Federal:**	None	**CNDDB Element Ranks:**	**Global:**	G4T4
	State:	None		**State:**	S3
	Other:	AFS_VU-Vulnerable, CDFW_SSC-Species of Special Concern, USFS_S-Sensitive			
Habitat:	**General:**	SMALL COASTAL STREAMS FROM THE EEL RIVER TO THE OREGON BORDER.			
	Micro:	SMALL, LOW GRADIENT COASTAL STREAMS AND ESTUARIES. NEEDS SHADED STREAMS WITH WATER TEMPERATURES <18C, AND SMALL GRAVEL FOR SPAWNING.			

Oncorhynchus mykiss irideus pop. 16 **Element Code:** AFCHA0209Q

steelhead - northern California DPS

Listing Status:	**Federal:**	Threatened	**CNDDB Element Ranks:**	**Global:**	G5T2T3Q
	State:	None		**State:**	S2S3
	Other:	AFS_TH-Threatened			
Habitat:	**General:**	COASTAL BASINS FROM REDWOOD CREEK SOUTH TO THE GUALALA RIVER, INCLUSIVE. DOES NOT INCLUDE SUMMER-RUN STEELHEAD.			
	Micro:				

Spirinchus thaleichthys **Element Code:** AFCHB03010

longfin smelt

Listing Status:	**Federal:**	Candidate	**CNDDB Element Ranks:**	**Global:**	G5
	State:	Threatened		**State:**	S1
	Other:				
Habitat:	**General:**	EURYHALINE, NEKTONIC & ANADROMOUS. FOUND IN OPEN WATERS OF ESTUARIES, MOSTLY IN MIDDLE OR BOTTOM OF WATER COLUMN.			
	Micro:	PREFER SALINITIES OF 15-30 PPT, BUT CAN BE FOUND IN COMPLETELY FRESHWATER TO ALMOST PURE SEAWATER.			

Thaleichthys pacificus **Element Code:** AFCHB04010

eulachon

Listing Status:	**Federal:**	Threatened	**CNDDB Element Ranks:**	**Global:**	G5
	State:	None		**State:**	S2
	Other:				
Habitat:	**General:**	FOUND IN KLAMATH RIVER, MAD RIVER, REDWOOD CREEK, AND IN SMALL NUMBERS IN SMITH RIVER AND HUMBOLDT BAY TRIBUTARIES.			
	Micro:	SPAWN IN LOWER REACHES OF COASTAL RIVERS WITH MODERATE WATER VELOCITIES AND BOTTOM OF PEA-SIZED GRAVEL, SAND, AND WOODY DEBRIS.			

USFWS iPaC

- Birds
- Marbled Murrelet *Brachyramphus marmoratus*

  Threatened
- Short-tailed Albatross *Phoebastria (=Diomedea) albatrus*

  Wherever found

  Endangered
- Reptiles
- Green Sea Turtle *Chelonia mydas*

Threatened

- Fishes
- Tidewater Goby *Eucyclogobius newberryi*

Wherever found [Note dependent on estuary habitat, not coastal]

Endangered

- Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

- Tidewater Goby *Eucyclogobius newberryi*

Final, coastal habitat is not within designated critical habitat.