Chapter 3.1

Agricultural Resources

3.1 Agricultural Resources

3.1.1 Introduction

This section evaluates environmental impacts of the Proposed Project on agricultural resources. This evaluation primarily relates to marine aquaculture activities, such as oyster and kelp farming. *Aquaculture* is the general term for cultivation of aquatic organisms inland or in marine environments. *Mariculture* is the specific term for the farming of marine aquatic species such as fish, crustaceans, mollusks, and seaweed. Aquaculture practiced in California is conducted both inland and along the coast. Marine aquaculture in California primarily involves cultivation of mollusks such as abalone, oysters, clams, mussels, and scallops, and cultivation of edible seaweed, such as kelp. The section provides a review of federal, state, and local laws and regulatory policies applicable to aquaculture, a discussion of current aquaculture activities in the North Coast Study Region (Study Region), and an analysis of potential impacts of the Proposed Project. Data and information sources used to prepare this section include federal, state, and local regulations, the *Regional Profile of the North Coast Study Region: California/Oregon Border to Alder Creek* (MLPAI 2010), and other relevant reference material.

3.1.2 Regulatory Setting

Federal Laws, Regulations, and Policies

National Offshore Aquaculture Act

The National Offshore Aquaculture Act of 2007 (House of Representatives 2010 and Senate 1609) is designed to support offshore aquaculture industry within the U.S. Exclusive Economic Zone that will produce food and valuable products. The Act establishes a permitting process to encourage private investment in aquaculture. The U.S. Exclusive Economic Zone is considered to extend 200 nautical miles from the low water mark along the coastline, and thus includes the Proposed Project.

State Laws, Regulations, and Policies

California Aquaculture Development Act

The California Aquaculture Development Act (PRC, Sections 825–830) states that "… it is in the interest of the people of the state that the practice of aquaculture be encouraged in order to augment food supplies, expand employment, promote economic activity, increase native fish stocks, enhance commercial and recreational fishing, and protect and better use the land and water resources of the state." The purpose of this Act is to establish a policy and program toward improving science and the practice of aquaculture.

California Coastal Act Section 30411c

Section 30411 of the California Coastal Act declares that "saltwater or brackish water aquaculture is a coastal dependent use which should be encouraged…." This section further provides that the Department has the authority to identify coastal sites it determines to be appropriate for aquaculture facilities. When such sites are identified, the Department will

transmit this information to the Commission and local government agencies, who will then acknowledge the identified sites for uses that are consistent with the policies of Chapter 3, Section 30200, of the California Coastal Act.

California Fish and Game Code Section 17

The California Fish and Game Code (FGC, Section 17) defines *aquaculture* as a "… form of agriculture devoted to propagation, cultivation, maintenance and harvesting of aquatic plants and animals in marine, brackish and fresh water." This definition does not include ornamental marine or freshwater plant and animal species not used for human consumption or bait.

California Food and Agriculture Code Section 23.5

The California Food and Agriculture Code (Section 23.5) states that aquaculture as defined by FGC, Section 17 is "… considered a branch of the agricultural industry of the state for the purpose of any law that provide for the benefit or protection of agricultural industry of the state except those relating to plant quarantine or pest control."

Senate Bill 201

Senate Bill 201 (enacted in 2005) amends a number of FGC sections and PRC Section 30411, that apply to aquaculture. PRC Section 30411(e) requires the Department to prepare a programmatic environmental impact report (PEIR) for both coastal and inland commercial finfish aquaculture projects within state waters. Senate Bill 201 repealed the previous PEIR requirement and requires a PEIR to prepare a framework for managing marine finfish aquaculture in a sustainable manner that considers specific environmental factors.

The Programmatic Aquaculture EIR is in the administrative DEIR stage, under review by the Department. A draft is expected to be available for public review in early 2012. General guidance for locating aquaculture within state waters will be described in this forthcoming PEIR. The PEIR will not identify specific locations or proposals for marine finfish aquaculture (Mello, pers. comm., 2011). Once the PEIR process is complete and associated regulations are adopted, finfish mariculture will be allowed within state waters.

The Sustainable Oceans Act 2006

The Sustainable Oceans Act of 2006 (FGC, Sections 15400, 15405, 15406, 15406.5, and 15409) regulates the right to grant state water bottom or water column leases for aquaculture in state waters. Marine aquaculture of plants and animals is prohibited without a lease from the Commission. An agreement with the Commission is made by filling out the "State of California Department of Fish and Game Application for Lease of State Water Bottoms for Aquaculture" application, accompanied by a legal description of the location and a map. An appropriate fee is declared and to be paid with submittal of the application.

Local Plans, Policies, Laws, and Regulations

Humboldt Bay Management Plan

The Humboldt Bay Harbor Recreation and Conservation Act, passed by the State Legislature in 1970, was designed to establish an agency to oversee development of Humboldt County harbors and ports. The Humboldt Bay Harbor Recreation and Conservation District (Harbor District) was created to address this need, as ratified by Humboldt County in 1973. The Harbor District has permit jurisdiction over all tidal, submerged and other lands granted to the District for the whole of Humboldt County. Aquaculture leases in Humboldt Bay are granted by the Harbor District, the City of Arcata, and the City of Eureka. (Harbor District 2007)

The *Humboldt Bay Management Plan* was developed by the Harbor District in 2007. The goals of the plan are to aid landowners and agency land managers, to guide planning within and around Humboldt Bay. The plan seeks to balance the conservation goals of the area with economic opportunities in Humboldt Bay. The plan identifies four water use classifications for Humboldt Bay, shown in **Figure 3.1-1**.

The two primary water use designations are *Harbor* and *Bay Conservation*. The Harbor designation classifies areas for port or harbor-related waters adjacent to upland areas. Bay Conservation classifications are environmental or natural resource areas that should be protected, restored, or enhanced. Other water use designations are *Marine Recreation* and *Mariculture*. The Marine Recreation designation indicates an area where recreational activities can occur and are encouraged. The Mariculture designation is for areas where shellfish, algae, and kelp aquaculture is allowed. Mariculture uses are only designated in Arcata Bay and the Mad River Slough. Most of south Humboldt Bay is designated as Bay Conservation area with small areas designated as Marine Recreation along the shoreline. (Harbor District 2007)

Policies related to aquaculture included the plan and applicable to the Proposed Project are:

- HFA-3: Protect appropriately designated shore side areas for the development, maintenance, or expansion of commercial fish processing and aquaculture facilities or activities
- HFA-5: Identify additional aquaculture opportunities in Humboldt Bay
- HFA-6: Designate a Preferred Aquaculture Use Area in Arcata Bay, and require Best Management Practices to meet environmental constraints
- HFA-7: Identify ecological and environmental factors affecting Humboldt Bay's fish populations, and the ecosystem elements that support them

3.1.3 Environmental Setting

Aquaculture in the Study Region involves shellfish farming. No offshore finfish aquaculture activities currently occur within the Study Region because they are not yet authorized in the state.

Shellfish Aquaculture

The Study Region's shellfish aquaculture industry primarily produces oysters, although clams, scallops, and mussels also are cultivated to a lesser extent. Shellfish aquaculture generally is focused in the northern portion of Humboldt Bay (known as Arcata Bay) because of its excellent water quality, healthy estuarine environment, and sheltered location. In 2002, over 74,000 gallons of oysters were harvested from Humboldt Bay. (Harbor District 2007)

Six operators hold leases for mariculture activities in the Study Region; five operators are located in Humboldt Bay, and one operator is located in Crescent City Harbor. Aquaculture farming operations typically only use a small portion of the entire leased area for active cultivation. Coast Seafoods Company, the largest operator in the Study Region, leases over 1,000 acres in the Humboldt Bay Harbor, although it only uses about one third of this area for active farming. The other operators hold smaller leases, ranging from approximately 10 to 350 acres. More than half of the oysters sold in California are grown in Humboldt Bay, and in 2007, the six operators in the region generated total sales of approximately $6 million. (MLPAI 2010)

Shellfish companies sell both market-ready products (for direct consumption) and seedlings for sale to other farms. Humboldt Bay is the only approved California source for certified, disease-free oyster seedlings for export out of state and the country. (MLPAI 2010)

Cultivation practices for shellfish include a variety of techniques that suspend the oysters above the seafloor, preventing predation. The "rack-and-bag" method involves oysters cultivated in a net bag, supported above the ground on steel racks. The "long line" culture method cultivates oysters by inserting baby oysters every foot or so along a rope that is suspended above the seafloor 6–10 inches with PVC pipe. Other techniques practiced in Humboldt Bay include stake culture and floating racks or floating upwelling racks (FLUPSY). Floating racks or FLUPSYs are designed with stacked trays of shellfish underneath a raft and have mechanisms that create a constant current to provide nutrients to the shellfish. (Harbor District 2007)

Mariculture cultivation in Humboldt Bay is consistent with the water use designations established for Humboldt Bay by the *Humboldt Bay Management Plan*, as shown in **Figure 3.1-1**.

3.1.4 Impact Analysis

Methodology

Impacts were analyzed by comparing the locations of the proposed marine protected areas (MPAs) relative to existing mariculture sites, and where overlaps may exist, evaluating whether the MPA restrictions would affect mariculture activities.

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Figure 3.1-1
Humboldt Bay Water Use Designations

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Criteria for Determining Significance

Because the State CEQA Guidelines, Appendix G, thresholds for agricultural resources focus on terrestrial agriculture, they were not used for this analysis. Instead, they were replaced by the following criterion. The Proposed Project would have a significant impact on agricultural resources if it would:

A. directly or indirectly result in the substantial conversion of existing or future mariculture sites to nonmaricultural uses.

Environmental Impacts

Impact AGR-1: Loss or Conversion of Shellfish Aquaculture Areas (Significance Criterion A)

As discussed in section 3.1.3, "Environmental Setting," the majority of shellfish aquaculture in the Study Region occurs in the northern portion of Humboldt Bay, with a smaller amount occurring in Crescent City Harbor.

The Proposed Project does not identify any MPAs in Crescent City Harbor, but it does identify one MPA in Humboldt Bay: the South Humboldt Bay state marine recreational management area (SMRMA), located in the southwestern-most corner of the bay. The Proposed Project states that take of all living marine resources within this area would be prohibited, except for recreational take of waterfowl and activities conducted by authorized Native American groups. Under the Proposed Project, aquaculture would not be allowed to occur within the boundaries of the South Humboldt Bay SMRMA.

However, the soft bottom substrate of the southern portion of Humboldt Bay does not provide ideal habitat for cultivation of oysters, clams, or mussels, and no aquaculture activities are currently conducted or proposed within this area. Additionally, the Harbor District does not encourage commercial aquaculture activities in the south bay; the south bay is not zoned for aquaculture activities in the *Humboldt Bay Management Plan* (see **Figure 3.1-1**).

The Proposed Project would not result in the conversion of waters that are in use or proposed for shellfish aquaculture to nonaquacultural uses. The proposed South Humboldt Bay SMRMA and the proposed optional SMRMA configuration for the South Humboldt Bay would not conflict with or substantially reduce existing or future opportunities for shellfish aquaculture. This impact would be less than significant.

Level of Significance: *Less than Significant*

Chapter 3.2

Air Quality

3.2 Air Quality

3.2.1 Introduction

This section presents the regulatory setting, environmental setting, and potential impacts of the Proposed Project related to air quality. Data and information sources used to prepare this section include state and federal regulations, reference materials from the California Air Resource Board (CARB), the North Coast Unified Air Quality Management District (North Coast Unified AQMD), Mendocino County Air Quality District, and the *Regional Profile of the North Coast Study Region: California/Oregon Border to Alder Creek* (Regional Profile) (MLPAI 2010).

3.2.2 Regulatory Setting

Federal Laws, Regulations, and Policies

Clean Air Act

The U.S. Environmental Protection Agency (USEPA) carries out the provisions of the Clean Air Act (CAA), originally passed in 1963 and amended six times, most recently in 1990. USEPA implements programs under the CAA that focus on reducing ambient air pollutant concentrations, reducing emissions of toxic pollutants, and phasing out production and use of chemicals that destroy stratospheric ozone. USEPA sets ambient air limits, the National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: particulate matter, carbon monoxide, nitrogen oxides, sulfur oxides, ground-level ozone, and lead. The NAAQS are presented in **Table 3.2-1**. Primary standards are set for protection of human health and secondary standards are set for environmental protection. Areas that meet the primary standards are considered in "attainment" while areas with air quality not meeting the primary standards are in "nonattainment."

Of the six criteria pollutants, particulate matter and ground-level ozone pose the most widespread threat to human health. Particle pollution poses the greatest threat to sensitive receptors, including children, the elderly, and asthmatics, as it impairs lung function. Particle pollution includes very fine soot and dust. Sources of particulate matter include ground-disturbing activities (e.g., construction grading and excavation); motor vehicles; power-generation activities; industrial operations; burning of fuels (e.g., wood, oil, and coal); dust from unpaved roads; and crushing and grinding operations. Particle pollution can be carried by the wind and impair air quality far from its source. To reduce particle levels, USEPA regulates emissions from motor vehicles and point sources.

Table 3.2-1. State and Federal Ambient Air Quality Standards

Contaminant	Averaging Time	State Standards[1,3]	Primary Federal Standards[2,3,5]	Secondary Federal Standards[2,3,6]
Ozone	1-hour	0.09 ppm (180 µg/m^3)	-	-
	8-hour	0.070 ppm (137 µg/m^3, see note 4)	0.075 ppm (147 µg/m^3)	Same as primary standard
Respirable Particulate Matter (PM_{10})	24-hour	50 µg/m^3	150 µg/m^3	Same as primary standard
	Annual arithmetic mean	20 µg/m^3	-	-
Fine Particulate Matter ($PM_{2.5}$)	24-hour	-	35 µg/m^3	Same as primary standard
	Annual arithmetic mean	12 µg/m^3	15 µg/m^3	Same as primary standard
Carbon Monoxide	8-hour	9.0 ppm	9 ppm (10 mg/m^3)	None
	1-hour	20 ppm	35 ppm (40 mg/m^3)	None
Nitrogen dioxide	Annual arithmetic mean	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3) [8]	Same as primary standard
	1-hour	0.18 ppm (339 µg/m^3)	0.100 ppm (188 µg/m^3) [8]	
Sulfur dioxide	24-hour	0.04 ppm (105 µg/m^3)	0.14 ppm (365 µg/m^3)	-
	3-hour	-	-	0.5 ppm (1,300 µg/m^3) [9]
	1-hour	0.25 ppm (655 µg/m^3)	75 ppb (196 µg/m^3) [9]	-
Lead[10]	30-day average	1.5 µg/m^3	-	-
	Calendar quarter	-	1.5 µg/m^3	Same as primary standard
	Rolling 3-month average[11]	-	0.15 µg/m^3	Same as primary standard
Visibility-reducing particles	8-hour	See note 7	-	-
Sulfates	24-hour	25 µg/m^3	-	-
Hydrogen Sulfide	1-hour	0.03 ppm (42 µg/m^3)	-	-
Vinyl Chloride[10]	24-hour	0.01 ppm (26 µg/m^3)	-	-

Table 3.2-1. State and Federal Ambient Air Quality Standards

Contaminant	Averaging Time	State Standards[1,3]	Primary Federal Standards[2,3,5]	Secondary Federal Standards[2,3,6]

Notes: C = Celsius (in notes below), µg/m^3 = micrograms per cubic meter, $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter, PM10 = particulate matter less than 10 microns in diameter, ppb = parts per billion by volume, ppm = parts per million by volume, SO_2 = sulfur dioxide (in notes below), torr = Torricelli (unit of pressure equal to 1/760 atmosphere, in notes below)

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, suspended particulate matter (PM10 and PM2.5), and visibility-reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth-highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. For PM2.5, the 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the U.S. Environmental Protection Agency for further clarification and current federal policies.
3. Concentration is expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent procedure that can be shown to the satisfaction of the California Air Resources Board (CARB) to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Extinction coefficient of 0.23 per kilometer—visibility of 10 miles or more (0.07—30 miles or more for Lake Tahoe) resulting from particles when relative humidity is less than 70%. Method: Beta Attenuation and Transmittance through Filter Tape.
8. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010). Note that the USEPA standards are in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national standards with the California standards, the units can be converted from ppb to ppm. In this case, the national standards of 53 ppb and 100 ppb are identical to 0.053 ppm and 0.100 ppm, respectively.
9. On June 2, 2010, USEPA established a new 1-hour SO2 standard, effective August 23, 2010, which is based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. USEPA also proposed a new automated Federal Reference Method (FRM) using ultraviolet technology, but will retain the older pararosaniline methods until the new FRM have adequately permeated state monitoring networks. USEPA also revoked both the existing 24-hour SO2 standard of 0.14 ppm and the annual primary SO2 standard of 0.030 ppm, effective August 23, 2010. The secondary SO2 standard was not revised at that time; however, the secondary standard is undergoing a separate review by USEPA. Note that the new standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the new primary national standard with the California standard, the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
10. CARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
11. National lead standard, rolling 3-month average: final rule signed October 15, 2008.

Source: CARB 2011

Ground-level ozone is the primary component of smog. Ozone is formed from the interaction of reactive organic gases (ROGs) and nitrogen oxides (NOx). ROG is emitted by motor vehicles, industrial activities, and consumer products (such as paints, inks, and adhesives). NOx is formed during the burning of fossil fuels, such as gasoline, diesel fuel, coal, and oil. Weather and topography influence the formation and location of ground-level

ozone. Hot temperatures spur the reaction between volatile organic compounds and NOx to form ozone. Ground-level ozone settles into valleys when winds are calm and temperatures are warm. Sensitive receptors to ozone are the same as those listed for particulate matter, with the addition of forests and agricultural crops.

The CAA establishes Class I, II, and III areas, where emissions of particulate matter and sulfur dioxide (SO_2) are to be restricted. The restrictions are most severe in Class I areas and are progressively more lenient in Class II and III areas. Mandatory Class I federal lands include all national wilderness areas exceeding 500 acres. Such lands may not be redesignated (42 U.S. Code [USC] 7472). Additionally, national wildlife refuges that exceed 10,000 acres may only be redesignated by states as Class I or Class II areas (42 USC 7474). There are 156 mandatory Class I Areas in the United States. Of these, the Redwood National Park is adjacent to the North Coast Study Region (Study Region) (USEPA 2011).

The USEPA regulates emissions from marine engines through requirements for fuel improvements and emission limits for new and existing engines.

State Laws, Regulations, and Policies

California Air Resources Board

CARB was established in 1967. CARB has set California Ambient Air Quality Standards (CAAQS), presented in Table 3.2-1, that are more stringent than the NAAQS for most contaminants. These include standards for additional contaminants not covered in the NAAQS, including visibility-reducing particles, sulfates, hydrogen sulfide, and vinyl chloride. The California Clean Air Act was passed in 1988 and requires that nonattaintment areas achieve and maintain the CAAQS by the earliest time practicable, and local air districts to develop attainment plans for state standards.

CARB regulates mobile source emissions in the state, while local air-quality management districts permit stationary sources. For commercial harbor craft, CARB conducts regulatory activities to reduce diesel particulate matter (PM), NOx, and ROG. Specific regulations implemented by CARB pertain to engine specifications and fuel use requirements.

Toxic Air Contaminants

Many pollutants are identified as toxic air contaminants (TACs) because of their potential to increase the risk of developing cancer or their acute or chronic health risks. Individual TACs vary greatly in the risk they present. At a given level of exposure, one TAC may pose a hazard that is many times greater than another.

There are not any state or federal standards for TACs. However, for TACs that are known or suspected carcinogens, CARB has consistently found that there are no levels or thresholds below which exposure is risk-free. For certain TACs, a unit risk factor can be developed to evaluate cancer risk. For acute and chronic health risks, a similar factor, called a hazard index, is used to evaluate risk.

The California Air Toxics Program was established in the early 1980s for the identification and control of TACs, and it includes provisions to make the public aware of significant toxic

exposures and for reducing risk. Under the Toxic Air Contaminant Identification and Control Act (Assembly Bill [AB] 1807), CARB is required to use certain criteria in the prioritization for the identification and control of air toxics. The Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, Connelly 1987) supplements AB 1807 by requiring stationary sources to report the types and quantities of certain substances routinely released into the air. AB 2588 requires facilities that pose a significant health risk to the community to reduce their risk through a risk management plan (CARB 2010).

Local Plans, Policies, Laws, and Regulations

CARB has designated 15 air basins in the state. Within the state, 35 local air quality management districts are responsible for attainment and permitting in each basin and subbasin area. Commercial fishing vessels, which are the focus of this section, are not directly regulated by any of the individual districts. Like other mobile sources, the emissions from marine engines are subject to limits adopted at the federal or state level, as discussed above.

The Study Region adjacent to the North Coast Air Basin (NCAB), which spans from northern Sonoma County to the California/Oregon border. The two AQMDs (Air Quality Management Districts) within the NCAB and adjacent to the Study Region are the Mendocino County Air Quality Management District (MCAQMD) and the North Coast Unified Air Quality Management District (NCUAQMD), which covers Humboldt and Del Norte Counties.

Bay Area Air Quality Management District CEQA Guidelines

As of June 3, 2010 the MCAQMD issued new CEQA guidance that requested use of the Bay Area Air Quality Management District's (BAAQMD's) 2010 updated CEQA thresholds, adopted on May 28, 2010, to evaluate new projects. Subsequently, the BAAQMD published its latest version of the State CEQA Guidelines in May 2011, to aid assessment of air quality impacts. The guidelines address evaluation of air quality impacts and their significance, and development of mitigation measures for significant impacts. The guidelines focus on criteria air pollutants, TACs, and odor emissions generated from projects.

3.2.3 Environmental Setting

Climate

Climate and topography dictate the potential for air pollution to build up or concentrate in geographic areas. Wind speed, inversions, atmospheric stability, solar radiation, and terrain all influence air pollution potential. The actual air quality is a function of the air pollution potential and the existing emissions at any given time.

Wind speed affects air quality because faster winds carry pollutants away from the source. Low wind speeds allow more pollutants to be emitted into the air mass per unit of time, leading to a buildup of pollutant concentration. Similarly, inversions influence the mass of air available for dilution by vertically limiting the distance pollutants can travel. An inversion occurs when the typical atmospheric condition of "temperature decreases with elevation increases" is reversed, or "inversed." Inversions may result in a layer of warmer

air resting over a layer of cooler air. The denser cooler air is trapped below the less dense warm air. In this inversion situation, pollutants emitted are trapped beneath the warmer air aloft and within the cooler air lower to the ground. This situation, in combination with reduced circulation, reduces opportunities for mixing and dispersion, potentially leading to higher pollutant concentrations and poorer air quality.

North Coast Air Basin

Existing Air Quality

Coastal areas along Mendocino, Humboldt, and Del Norte Counties are primarily rural, and generally sparsely populated, which contributes to the generally good air quality in the area. Cool temperatures, rainfall, and extensive cloud cover characterize the climate along the coastline of northern California for much of the year. In the NCAB, dominant winds have a seasonal pattern in the coastal areas. Strong north to northwesterly winds are common in the summer months. In the winter, storms from the southern Pacific increase the amount of days with southern winds. Offshore and onshore winds associated with pressure systems in the area are common along the coast. Onshore winds frequently bring cool foggy weather to the coast, while offshore flows blow fog away from the coast and bring warmer sunny days. Two types of temperature inversions, which affect the depth through which pollutants can be mixed, occur in inland areas: radiation inversion, in which the air layer near ground cools, and subsidence inversion, in which gradually sinking air warms as it descends (Humboldt County 2009).

Attainment Status

Air quality is a function of the climate, topography, and emissions in any area or upwind of that area. **Table 3.2-2** presents the attainment status of the state and federal standards in the NCAB. The NCAB, which includes Del Norte, Humboldt, and Mendocino Counties, is in attainment or unclassified according to federal standards for ozone, respirable particulate matter, fine particulate matter, carbon monoxide, and nitrogen dioxide. According to state standards, the NCAB is in attainment or unclassified for all ozone, fine particulate matter ($PM_{2.5}$), carbon monoxide, nitrogen dioxide, SO_2, lead, visibility-reducing particles, sulfates, and hydrogen sulfide. However, the NCAB is in nonattaintment for respirable particulate matter (PM_{10}).

In the NCAB, the primary source of PM_{10} emission is dust generated from unpaved roads, accounting for about 60% of PM_{10} emissions. Other sources of PM_{10} emissions are wood stoves and fireplaces, ocean spray, pollen from trees and plants, dust from paved roads, and construction and demolition. Wood smoke is more prevalent in the winter months when wood stoves are in use and outdoor burning is allowed. Dust levels are higher in the summer and early fall. Salt from the ocean spray contributes to PM_{10} levels most often when winds blow the salt spray inland (Mendocino County 2009).

Table 3.2-2. North Coast Air Basin Attainment Status of the State and Federal Ambient Air Quality Standards

Contaminant	State Standards Attainment Status[1]	Federal Standards Attainment Status[2]
Ozone (1-hour)	A	See note 3
Ozone (8-hour)	A	A/U
Respirable Particulate Matter (PM_{10})	N	U
Fine Particulate Matter ($PM_{2.5}$)	U	A/U
Carbon Monoxide	A/U	A/U
Nitrogen Dioxide	A	A/U
Sulfur Dioxide	A	U
Lead	A	-
Visibility Reducing Particles	U	-
Sulfates	A	-
Hydrogen Sulfide	A/U	-

Notes: $\mu g/m^3$ = micrograms per cubic meter (in notes below), A = attainment, N = nonattaintment, ppb = parts per billion by volume (in notes below), ppm = parts per million (in notes below), U = unclassified

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, suspended particulate matter (PM10), and visibility-reducing particles are values that are not to be exceeded. The standards for sulfates, Lake Tahoe carbon monoxide, lead, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded. If the standard is for a 1-hour, 8-hour, or 24-hour average (i.e., all standards except for lead and the PM10 annual standard), then some measurements may be excluded. In particular, measurements are excluded that the California Air Resources Board determines would occur less than once per year on average. The Lake Tahoe carbon monoxide standard is 6.0 ppm, a level one-half the national standard and two-thirds the state standard.
2. National standards shown are the "primary standards" designed to protect public health. National standards other than for ozone, particulates, and those based on annual averages are not to be exceeded more than once a year. The 1-hour ozone standard is attained if, during the most recent 3-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than 1. The 8-hour ozone standard is attained when the 3-year average of the fourth-highest daily concentrations is 0.075 ppm (75 ppb) or less. The 24-hour PM10 standard is attained when the 3-year average of the 99th percentile of monitored concentrations is less than 150 $\mu g/m^3$. The 24-hour $PM_{2.5}$ standard is attained when the 3-year average of 98th percentiles is less than 35 $\mu g/m^3$. Except for the national particulate standards, annual standards are met if the annual average falls below the standard at every site. The national annual particulate standard for PM_{10} is met if the 3-year average falls below the standard at every site. The annual $PM_{2.5}$ standard is met if the 3-year average of annual averages, spatially averaged across officially designed clusters of sites, falls below the standard.
3. The national 1-hour ozone standard was revoked by the U.S. Environmental Protection Agency on June 15, 2005.
4. Data is current as of June 23, 2011 for State Area Designations and February 2011 for National Area Designations.

Source: CARB 2011

Sensitive Receptors

Specific to this section is the term “sensitive receptors,” meaning those people, and various facilities and areas, that are particularly susceptible to the adverse effects of air pollution. These include children, the elderly, and people with illnesses, and can include schools, nursing homes, hospitals, and residential areas. Air pollution can cause adverse health effects in humans, including aggravating asthma conditions and other respiratory problems (BAAQMD 2010). Sensitive receptors adjacent to the Study Region are numerous, and include people in residential areas, schools, elder care facilities, and hospitals. Sensitive receptors near the Study Region would primarily be located on land but would be

numerous, and would include people in residential areas, schools, elder care facilities, and hospitals.

3.2.4 Impact Analysis

Methodology

This section describes the methods used to determine the Proposed Project's impacts related to criteria air pollutant emissions. The impacts related to emissions of criteria air pollutants from the Proposed Project were evaluated quantitatively for commercial fishing vessels and qualitatively for recreational fishing vessels. Methods to evaluate both commercial and recreational fishing vessels are discussed below. No potential sources of odor from the Proposed Project have been identified. Therefore, no impacts related to odors would occur and this issue is not discussed further.

Commercial Fishing Vessels

The creation of a network of marine protected areas (MPAs) in the Study Region would restrict commercial fishing activities in certain areas. In response to restrictions within the MPAs, commercial fishing vessels would either transit to different locations to fish in unrestricted areas outside of MPA boundaries, or stop fishing altogether. This analysis assumes that commercial fishing vessels travel just beyond an MPA and continue fishing, resulting in slightly longer distances traveled. The increased time required to travel longer distances would increase the duration of combustion activities and increase associated emission of criteria air pollutants, compared with existing conditions. This assessment quantifies only those criteria air pollutants emissions resulting from the displacement of commercial fishing trips, or in other words the increment of emissions resulting from increased travel distances and times. This analysis does not quantify emissions from existing vessel trips, as these trips currently occur outside of the actions proposed by the Proposed Project and are considered part of the baseline conditions. Criteria air pollutants emissions from displacement were calculated using data of commercial fishing vessel activity and energy-based emission factors.

Data for all commercial fishing vessel activity (excluding commercial passenger fishing vessels [CPFVs], which are included in the discussion of "Recreational Vessels" below) from 2007 and 2008[1] in the Study Region was obtained from the Department. The data set was filtered to include only commercial fishing trips that occurred in a 1x1 mile fishing block[2] containing all or a portion of a Study Region MPA. Filtering the data set in this manner limited vessel trips to those potentially displaced by MPAs. This includes vessels from the Eureka and North Fort Bragg Port Complexes, as well as vessels from outside of the Study Region, such as Oregon or the San Francisco Bay area. Vessel trips within the Study Region that are not currently destined to a fishing block with an MPA were excluded from this analysis, as they do not have the potential to be displaced.

[1] For consistency with data years in other sections and chapters of this EIR and in Appendix B, the same years were used in this analysis. No dramatic changes in fishing regulations have occurred since 2008 and therefore the patterns are expected to reasonably approximate more recent trends.

[2] A fishing block is a standardized area used to describe the general location of fishing activity for the purposes of data reporting and collection.

Commercial fishing effort was assumed to be uniform throughout each fishing block, although MPAs cover only a portion of each fishing block. Therefore, the quantity of displaced vessel trips within each fishing block was assumed to be equivalent to the percentage of fishing block area covered by an MPA. For example, where an MPA would cover ten percent of the area of a fishing block, it was assumed that ten percent of the trips to that fishing block would be displaced, and the additional emissions from those displaced vessels were modeled in this analysis. Displaced vessel trips were assigned to either the NCUAQMD or the MCAQMD. Since it was assumed that vessels would transit additional distances in the proximity to MPAs, vessel trips were assigned to an AQMD based on the location of the fishing block (i.e., trip destination) with respect to the boundaries of the AQMDs. For each AQMD, average daily and maximum annual criteria air pollutant emissions were calculated.

The emissions model was derived from the USEPA's *Current Methodologies and Best Practices in Preparing Port Emissions Inventories* (ICF Consulting 2006), and used the following equation:

Emissions (grams) = **P x LF x A x EF**

Where **P** = Maximum Continuous Rating Power (kilowatts [kW])

LF = Load Factor (percentage of vessel's total power)

A = Activity (hours)

EF = Emission Factor (grams per kilowatt-hour [g/kWh])

Criteria air pollutant emissions were calculated for each displaced vessel trip. Data of each vessel's maximum continuous power was available for each vessel in the data set. For the load factor, it was assumed that ships would be traveling at service or cruise speed. The activity duration used for this analysis was equivalent to the increased duration of vessel transit resulting from displacement. It was assumed that on average, each vessel would transit an additional distance equal to the along-shore distance of an MPA. To estimate the increased activity duration, it was considered that each vessel would travel "out and back" to avoid fishing in an MPA, at an average vessel speed of 18 miles per hour (average cruise speed [ICF Consulting, 2006]). The one-way displaced along-shore distance for each vessel was estimated as the average MPA distance within each AQMD. Accordingly, within the NCUAPCD the average along-shore distance is estimated to be 2.8 statute miles (mi); within the MCAPCD, the average along-shore distance is estimated to be 2.45 mi.

Using the described model increased emissions of the following air pollutants from vessel displacement was calculated: NOx, carbon monoxide (CO), hydrocarbons (HC), PM_{10}, $PM_{2.5}$, and SO_2. Energy-based air pollutant emission factors were used in this analysis, as shown in **Table 3.2-3**.

Table 3.2-3. Criteria Air Pollutant Emissions Factors

Minimum Vessel Horsepower (hp)	Emissions Factor (grams/kW hour)					
	NOx	CO	HC	PM_{10}	$PM_{2.5}$	SO_2
50	11.00	2.00	0.27	0.90	0.87	0.63
100	10.00	1.70	0.27	0.40	0.39	0.63
175	10.00	1.50	0.27	0.40	0.39	0.63
300	10.00	1.50	0.27	0.30	0.29	0.63
600	10.00	1.50	0.27	0.30	0.29	0.63
750	10.00	1.50	0.27	0.30	0.29	0.63
1,341	13.00	2.50	0.27	0.30	0.29	0.63

Notes: grams/kW hours = grams per kilowatt hour, CO = carbon monoxide, HC = hydrocarbons, NOx = nitrogen oxides, PM2.5 = particulate matter less than 2.5 microns in diameter, PM10 = particulate matter less than 10 microns in diameter, SO2 = sulfur dioxide

Source: ICF International 2006.

Recreational Vessels

Recreational vessels include CPFVs, private recreational fishing vessels, and other craft used solely for the purposes of recreational activities, such as boats for scuba diving, and sailing boats. Of all types of recreational vessels, the Proposed Project would be expected to primarily affect trips related to consumptive recreational activities, including CPFVs and other recreational fishing vessels.

A qualitative assessment of potential increased criteria air pollutant emissions from displacement of recreational vehicles has been provided because the available data on recreational vessel use is limited. Although a substantial number of noncommercial vessels are located within the Study Region, detailed data on recreational vessel use, such as that collected for commercial vessel activity (above), is not available. The data collected by the Department includes information related to CPFVs, but not for other private recreational vessels. Information on the location of these other recreational vessels, the number of trips taken, the purpose of trips, and the types of fuel and engines used by these boats is not feasible to obtain. Thus, any attempt to produce an emissions estimate would require a number of speculative assumptions. Because the Regional Profile shows that the majority of recreational vessel trips between 2005 and 2008 were overwhelmingly private boats, using the data for CPFVs to estimate the overall level of recreational vessel emissions would be inaccurate.

This analysis assumes that displaced recreational fishermen will travel longer distances with greater travel times to new destinations. It was assumed that on average, each vessel would transit an additional distance equal to the along-shore distance of an MPA.

Criteria for Determining Significance

Using the significance criteria from Appendix G of the State CEQA Guidelines and professional expertise, the Proposed Project would have a significant impact on air quality if it would:

A. conflict with or obstruct implementation of the applicable air quality plan;

B. violate any stationary source air quality standard or contribute substantially to an existing or projected air quality violation;

C. result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattaintment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);

D. expose sensitive receptors to substantial pollutant concentrations; or

E. create objectionable odors affecting a substantial number of people.

As described above, MCAQMD has adopted the BAAQMD CEQA thresholds of significance. NCUAQMD has not published CEQA guidelines and has established significance thresholds only for major stationary sources, but not mobile sources. For the purposes of this analysis we have applied the BAAQMD CEQA thresholds of significance for emissions within the NCUAMD air basin (refer to section 3.2.2 for BAAQMD thresholds). Air quality with the portion of the NCAB managed by the NCUAQMD is potentially dissimilar to air quality in the San Francisco Bay Area Air Basin because of different climatic, topographic, and other conditions. However, the BAAQMD CEQA thresholds represent the best available published thresholds for evaluating criteria air pollutant emissions in this region for the purposes of CEQA, and allows for a consistent analysis across the Study Region. **Table 3.2-4** below shows the BAAQMD CEQA thresholds for criteria air pollutant emissions from nonstationary (mobile) sources.

Table 3.2-4. BAAQMD CEQA Thresholds of Significance for Criteria Air Pollutants

Criteria Air Pollutants and Precursors (Regional)	Operational Thresholds	
	Average Daily Emissions (lb/day)	Maximum Annual Emissions (tpy)
Reactive Organic Gases (ROG)	54	10
Nitrogen oxides (NOx)	54	10
Particulate Matter (PM_{10})	82	15
Particulate Matter ($PM_{2.5}$)	54	10
PM_{10}/$PM_{2.5}$ (fugitive dust)	None	
Local Carbon Monoxide (CO)	9.0 ppm (8-hour average), 20.0 ppm (1-hour average)	
Risk and Hazards for new sources and receptors (Individual Project)	Compliance with Qualified Community Risk Reduction Plan, or ■ Increased cancer risk of >10.0 in a million ■ Increased noncancer risk of > 1.0 Hazard Index (Chronic or Acute) ■ Ambient $PM_{2.5}$ increase: > 0.3 µg/m^3 annual average Zone of Influence: 1,000-foot radius from property line of	

Table 3.2-4. BAAQMD CEQA Thresholds of Significance for Criteria Air Pollutants

Criteria Air Pollutants and Precursors (Regional)	Operational Thresholds	
	Average Daily Emissions (lb/day)	Maximum Annual Emissions (tpy)
	source or receptor	
Risk and Hazards for new sources and receptors (Cumulative Threshold).	Compliance with Qualified Community Risk Reduction Plan. or ■ Cancer risk: >100 million (from all local sources) ■ Noncancer risk: > 10.0 Hazard Index (from all local sources, Chronic) ■ Ambient $PM_{2.5}$: > 0.8 µg/m^3 annual average (from all local sources) Zone of Influence: 1,000-foot radius from property line of source or receptor	
Accidental Release of Acutely Hazardous Air Pollutants	Storage or use of acutely hazardous materials located near receptors or new receptors located near stored or used acutely hazardous materials considered significant	
Odors	Five confirmed complaints per year averaged over 3 years	

Notes: µg/m3 = micrograms per cubic meter, lb/day = pounds per day; ppm = parts per million, tpy = tons per year
Source: BAAQMD 2011

Environmental Impacts

Impact AIR-1: Increased Emissions of NOx, PM10 and PM2.5 from Vessel Displacement (Significance Criteria A, B, and C)

Commercial Vessel Displacement

As discussed in the methodology section above, displacement of commercial fishing vessels could increase the distance and duration of vessel transit, resulting in increased criteria air pollutant emissions. Based on the BAAQMD CEQA guidelines, criteria air pollutants of concern for the Proposed Project include NOx, PM_{10} and $PM_{2.5}$. **Table 3.2-5** shows the average daily emissions and **Table 3.2-6** shows the maximum annual emissions of criteria air pollutants for commercial fishing vessels within each AQMD, based on the methodology outline above. Table 3.2-5 also demonstrates that average daily emissions for each criteria air pollutant considered is substantially lower than the respective BAAQMD average daily threshold. Table 3.2-6 also demonstrates that maximum annual emissions for each criteria air pollutant considered is substantially lower than the respective BAAQMD maximum annual threshold. The data used from 2007 and 2008 indicates that the vast majority (approximately 95%) of vessel trips potentially displaced as a result of the proposed MPAs would occur south of the northern Mendocino County boundary. As a result, a much larger quantity of criteria air pollutant emissions from vessel displacement would occur within the jurisdiction of the MCAQMD than that of the NCUAQMD.

Table 3.2-5. Average Daily Criteria Air Pollutant Emissions from Commercial Vessel Displacement

Jurisdiction/Geography	Average Daily Emissions (lb/day)			
	ROG	NOx	PM_{10}	$PM_{2.5}$
North Coast Unified AQMD	0.01	0.35	0.01	0.01
Mendocino County AQMD	0.02	0.42	0.01	0.01
Total North Coast Air Basin	0.03	0.77	0.02	0.02
BAAQMD Threshold	54	54	82	54

Notes: AQMD = Air Quality Management District, BAAQMD = Bay Area Air Quality Management District, lb/day = pounds per day, NOx = nitrogen oxides, $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter, PM_{10} = particulate matter less than 10 microns in diameter, ROG = reactive organic gas

Data from commercial vessel trips are from 2007 and 2008.

Source: Data compiled by Horizon Water and Environment in 2011

Table 3.2-6. Maximum Annual Air Pollutant Emissions from Commercial Vessel Displacement

Jurisdiction/Geography	Maximum Annual Emissions (tpy)			
	ROG	NOx	PM_{10}	$PM_{2.5}$
North Coast Unified AQMD	0.00	0.005	0.000	0.000
Mendocino County AQMD	0.01	0.101	0.004	0.003
Total North Coast Air Basin	0.01	0.107	0.004	0.004
BAAQMD Threshold	10	10	15	10

Notes: AQMD = Air Quality Management District, BAAQMD = Bay Area Air Quality Management District, NOx = nitrogen oxides, $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter, PM_{10} = particulate matter less than 10 microns in diameter, tpy = tons per year, ROG = reactive organic gas

Data are from commercial vessel trips from 2007 and 2008. Maximum annual emissions are from 2008, which had greater criteria air pollutant emissions than 2007 in both AQMDs.

Source: Data compiled by Horizon Water and Environment in 2011

Recreational Vessel Displacement

As discussed in the methodology section above, displacement of recreational fishing vessels used for consumptive and non-consumptive activities could increase the distance and duration of vessel transit, resulting in increased criteria air pollutant emissions (NOx, PM_{10} and $PM_{2.5}$). Because limited useful data are available on recreation vessel trips for consumptive uses, this displacement cannot be quantified.

As documented in the Regional Profile (MLPAI 2010), both shore-based and boat-based modes are common for recreational fishing in the Study Region. Boat-based modes of recreational fishing include CPFVs, as well as private and rental boats and kayaks. The Regional Profile shows that the majority of recreational vessel trips between 2005 and 2008 were overwhelmingly private boats. It is expected that private and rental boats use less energy and have less power than commercial fishing vessels and would emit slightly

less criteria air pollutant emissions per displaced trip. Some recreational vessels, such as kayaks, have no engines and would not emit criteria air pollutant emissions.

Overall, it is expected that displacement of recreational vessels would be less than, or at most, equal to commercial fishing vessel displacement. This would result in emissions of criteria air pollutant less than or, at most, equal to those from commercial fishing vessels.

Aggregate Displacement

Future commercial and recreational vessel trips within the Study Region could increase compared with 2007 and 2008 data used in this analysis. Seasonal fluctuations in fishing restrictions influences the number of vessel trips in a given year. For instance, starting in 2008, salmon fisheries were closed to commercial fishing, but have since reopened. As a result, it is expected that current commercial vessel trips are greater than in 2008. In addition, population growth over the next several decades is likely to result in greater demand for ocean fish commodities in the Study Region. To meet increased demand, an increase in commercial fishing activity is possible.

This overall increase in the number of annual commercial and recreational vessel trips would likely increase vessel displacement and criteria air pollutant emissions from the Proposed Project. This includes both average daily and maximum annual emissions within the NCUAQMD and MCAQMD. Even if daily and annual criteria air pollutant emissions within each of these jurisdictions compared with the emissions presented in Tables 3.2-5 and 3.2-6 were to double or triple, perhaps to account for larger amounts of displacement and/or recreational trips, criteria air pollutant emissions would be well below BAAQMD thresholds for each criteria air pollutant considered. In fact, the increase in emissions would need to be several orders of magnitude larger than has been estimated for each constituent before the threshold would be exceeded. Specifically, the increased emissions from displaced recreational trips would need to be more than 69 times greater than those resulting from displaced commercial trips before a BAAQMD threshold would be surpassed. On this basis, increased criteria air pollutant emissions from commercial and recreational fishing vessel displacement, including any future increase in overall vessel trips, are exceedingly unlikely to exceed BAAQMD thresholds for each criteria air pollutant considered. Increased criteria air pollutant emissions from displacement of vessels would be a less-than-significant impact.

Level of Significance: *Less than Significant*

Impact AIR-2: Increased Diesel Particulate Matter Health Risk from Vessel Displacement (Significance Criterion D)

Exhaust emissions from fishing vessels generate diesel PM, a TAC. Under the Proposed Project, displacement of commercial fishing vessels could increase the distance and duration of vessel transit, resulting in increased generation of diesel PM. Any increased diesel PM emissions would be distributed throughout the Study Region/NCAB and would be highly spatially variable.

Health risk assessments for diesel PM are typically based on 9-, 40-, and 70-year exposure periods. Because of the highly variable nature of diesel PM emissions associated with the Proposed Project, exposure to diesel exhaust for the exposure period of concern would be

limited at any particular location. Therefore, exposure of persons to diesel PM generated by the Proposed Project would be less-than-significant impact.

Level of Significance: *Less than Significant*

Impact AIR-3: Exposure of Sensitive Receptors to Increased Air Pollutant Emissions (Significance Criterion D)

Sensitive receptors near the Study Region, such as children, the elderly, and people with illnesses, would almost entirely be located on land. Any increased vessel emissions of criteria air pollutants and diesel PM would occur offshore within the Study Region. These emissions would be distributed throughout the region and would be spatially variable. However, it is not anticipated that sensitive receptors would be exposed to substantial increases in emissions. As discussed under Impact AIR-1, emissions of criteria air pollutants would occur at levels substantially below all applicable BAAQMD significance thresholds. Impacts on sensitive receptors would be less than significant.

Level of Significance: *Less than Significant*

Chapter 3.3

Global Climate Change and Greenhouse Gas Emissions

3.3 Global Climate Change and Greenhouse Gas Emissions

3.3.1 Introduction

This section describes the setting and potential impacts of the Proposed Project on greenhouse gas (GHG) emissions and climate change. Data and information sources used to prepare this section include *Climate Change 2007: The Physical Science Basis: Summary for Policymakers* (Intergovernmental Panel on Climate Change 2007), *Our Changing Climate: Assessing the Risks to California* (California Climate Change Center 2006), and information from the California Air Resources Board (CARB).

3.3.2 Regulatory Setting

Federal Laws, Regulations, and Policies

In the 2007, in *Massachusetts v. U.S. USEPA* (549 U.S. 497), the U.S. Supreme Court ruled that GHGs are air pollutants that are covered under the Clean Air Act (CAA). The Court found that the U.S. Environmental Protection Agency (USEPA) was required to determine whether emissions of GHGs from new vehicles cause or contribute to air pollution that may be anticipated to endanger public health or welfare. In 2009, the USEPA Administrator found that the current and projected concentrations of GHGs threaten public health and welfare of current and future generations and that combined emissions from new motor vehicles contribute to GHG pollution. On April 1, 2010, USEPA and the National Highway Traffic Safety Administration (NHTSA) established a program to reduce GHG emissions and improve fuel economy standards for new model year 2012–2016 cars and light trucks. On August 9, 2011, USEPA and NHTSA announced standards to reduce GHG emissions and improve fuel efficiency for heavy-duty trucks and buses.

To address large stationary emitters of GHGs, the USEPA also established mandatory reporting of GHG emissions for facilities that emit more than 25,000 metric tons of carbon dioxide equivalent (CO_2e) emissions per year. At the start of 2011, large stationary emitters must include GHG requirements in CAA permits if they are newly constructed or renovated and have the potential to emit more than 75,000 metric tons of CO_2e emissions per year. In 2011, operating permits will be required for all sources that emit at least 100,000 metric tons of CO_2e emissions per year. Sources producing less than 50,000 metric tons of CO_2e emissions per year will not be required to obtain permits for GHGs before 2016 (USEPA 2011). Because the Proposed Project does not involve any stationary sources, it would not trigger CAA permitting as required by USEPA regulations.

State Laws, Regulations, and Policies

Assembly Bill 1493

In 2002, Assembly Bill (AB) 1493 launched an innovative and proactive approach to dealing with GHG emissions and climate change at the state level. AB 1493 requires CARB to develop and implement regulations to reduce automobile and light-truck GHG emissions; these regulations apply to automobiles and light trucks beginning with the 2009 model year.

AB 1493 cited several potential risks that California faces from climate change, including reduction in the state's water supply, increased air-pollution creation by higher temperatures; harm to agriculture; increase in wildfires; damage to the coastline; and economic losses caused by higher food, water, energy, and insurance prices.

Assembly Bill 32 (Global Warming Solutions Act) and Executive Orders

On June 1, 2005, then-Governor Arnold Schwarzenegger signed Executive Order (EO) S-3-05. The goal of this EO is to reduce California's GHG emissions to (1) 2000 levels by 2010, (2) 1990 levels by the 2020, and (3) 80% below the 1990 levels by the year 2050. In 2006, this goal was further reinforced with the passage of AB 32, the Global Warming Solutions Act of 2006. AB 32 sets the same overall GHG emissions reduction goals, while further mandating that CARB create a plan (including market mechanisms) and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." EO S-20-06 further directs state agencies to begin implementing AB 32, including the recommendations made by the state's Climate Action Team. CARB is planning to release rules and regulations to implement GHG emissions reductions no later than January 1, 2012.

Senate Bill 97 and California Environmental Quality Act

In 2007, Senate Bill (SB) 97 was adopted to provide greater certainty to lead agencies that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis. Pursuant to SB 97, the California Natural Resources Agency adopted amendments to the State CEQA Guidelines to address analysis and mitigation of the potential effects of GHG emissions in CEQA documents and processes. These amendments became effective on March 18, 2010. Topics of the amendments include, but are not limited to (California Natural Resources Agency 2010):

- requiring a lead agency to make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate, or estimate the amount of GHG emissions resulting from a project;
- requiring a lead agency to consider the project's effect on GHG emissions in comparison to the existing setting, an exceedance of a significance threshold by the project, and the extent to which the project complies with adopted regulations or requirements among others, when assessing the significance of impacts from GHG emissions on the environment;
- identifying types of suitable/applicable mitigation measures for GHG emissions; and
- allowing project-specific environmental documents to tier from and/or incorporate by reference any existing programmatic review of GHG emissions, such as in a general plan, a long-range development plan, or a separate plan to reduce GHG emissions.

2009 California Climate Adaptation Strategy

The 2009 California Climate Adaptation Strategy (CAS) is a report prepared by the California Natural Resources Agency (CNRA) in response to Executive Order S-13-2008. CAS summarizes the best known science on climate change impacts and outlines possible solutions that can be implemented within and across state agencies to manage climate risks through adaptation. CNRA led the CAS effort by convening seven sector-specific working groups that worked to develop a comprehensive set of recommendations to inform and guide California decision makers as they develop policies to address climate change. The state agencies in the Coastal and Ocean Working Group (Ocean Protection Council, California Coastal Conservancy, California Coastal Commission, State Lands Commission, Department of Fish and Game, State Parks, and the Bay Conservation and Development Commission) have developed the following strategies to aid in the preparation of California's coastal infrastructure, industries, and ecosystems for the impacts of climate change.

- Strategy 1: Establish State Policy to Avoid Future Hazards and Protect Critical Habitat
- Strategy 2: Provide Statewide Guidance for Protecting Critical Ecosystems, Existing Coastal Development, and Future Investments
- Strategy 3: State Agencies should Prepare Sea-Level Rise and Climate Adaptation Plans
- Strategy 4: Support Regional and Local Planning for Addressing Sea-Level Rise Impacts
- Strategy 5: Complete a Statewide Sea-Level Rise Vulnerability Assessment Every 5 Years.

Each of the above strategies includes near-term actions that have already been initiated, or long-term actions that will require additional support and collaboration from state agencies and or significant legal or regulatory changes.

Local Plans, Policies, Laws, and Regulations

CARB has designated 15 air basins within the state. These basins are divided into 35 local Air Quality Management Districts (AQMDs), which are responsible for attainment and permitting within each basin and subbasin area. The North Coast Study Region (Study Region) is adjacent to the North Coast Air Basin (NCAB), which spans from northern Sonoma County to the California/Oregon border. The two AQMDs within the NCAB and adjacent to the Study Region are the Mendocino County Air Quality Management District (MCAQMD) and the North Coast Unified Air Quality Management District (NCUAQMD), which covers Humboldt and Del Norte Counties.

As of June 3, 2010, MCAQMD issued new CEQA guidelines that require the use of the Bay Area Air Quality Management District's (BAAQMD's) CEQA thresholds to evaluate new projects. NCUAQMD does not have published CEQA guidelines.

3.3.3 Environmental Setting

Greenhouse Gases and Climate Change

Anthropogenic emissions of GHGs are widely accepted in the scientific community as contributing to global warming. According to *Climate Change 2007: The Physical Science Basis: Summary for Policymakers* (Intergovernmental Panel on Climate Change 2007), there is no doubt that the climate system is warming. Global average air and ocean temperatures, as well as global average sea level, are rising. The period from 1995 through 2006 ranked as among the warmest on record since 1850. Although some of the increase is explained by natural occurrences, the 2007 report asserts that the increase in temperature is very likely (by a factor greater than 90%) caused by human activity, most notably from the burning of fossil fuels.

Climate change is a global problem, and GHGs are global pollutants, unlike criteria air pollutants (such as ozone precursors) and toxic air contaminants, which are pollutants of regional and local concern. GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and other pollutants. Emissions of CO_2 and N_2O are byproducts of fossil fuel combustion, among other sources. Methane, a highly potent GHG, results from off-gassing associated with agricultural practices and landfills, among other sources. The impacts from each of these other GHGs, besides CO_2, are often converted to CO_2e to measure how much global warming a given type and amount of GHG may cause. Global sinks of CO_2 include uptake by vegetation and dissolution into the ocean.

For California, projected effects from climate change are described in *Our Changing Climate: Assessing the Risks to California* (California Climate Change Center 2006). Based on projections using climate modeling, temperatures in California are expected to rise between 3 degrees Fahrenheit (°F) and 10.5°F (1.7 degrees Celsius [°C]and 5.8°C) by the end of the century, depending on how much California and the rest of the globe are able to reduce their GHG emissions. The report states that these temperature increases will negatively affect public health, water supply, agriculture, plant and animal species, and the coastline.

Worldwide, California is between the 11th and 12th largest emitter of CO_2 and is responsible for approximately 1.5% of the world's CO_2 emissions. In 2008, California emitted 477.74 million metric tons of CO_2e (CARB 2010).

The Intergovernmental Panel on Climate Change (IPCC) was commissioned by the World Meteorological Organization and United Nations Environment Program to assess scientific, technical, and socio-economic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. IPCC predicts that substantial increases in temperatures globally may affect the natural environment in California in the following ways (IPPC 2007):

- rising sea levels along the California coastline, particularly in San Francisco and the Sacramento–San Joaquin Delta caused by ocean expansion;
- extreme-heat conditions, such as heat waves and very high temperatures, which could last longer and become more frequent;
- an increase in heat-related human deaths, infectious diseases, and a higher risk of respiratory problems caused by deteriorating air quality;

- reduced snow pack and stream flow in the Sierra Nevada, affecting winter recreation and water supplies;
- potential increase in the severity of winter storms, affecting peak stream flows and flooding;
- changes in growing season conditions that may affect California agriculture, causing variations in crop quality and yield; and/or
- changes in distribution of plant and wildlife species because of changes in temperature, competition from colonizing species, changes in hydrologic cycles, changes in sea levels, and other climate-related effects.

These changes in California's climate and ecosystems are occurring at a time when California's population is expected to increase from 39 million to 59 million by 2050 (California Department of Finance 2007). Therefore, the number of people potentially affected by climate change, as well as the amount of anthropogenic GHG emissions anticipated under a "business as usual" scenario, is expected to increase. Similar changes as those noted above for California also are expected occur in other parts of the world, with regional variations in resources affected and vulnerability to adverse effects.

GHG emissions in California are attributable to human activities associated with the industrial/manufacturing, utilities, transportation, residential, and agricultural sectors, as well as natural processes. Transportation is responsible for 36% of the state's GHG emissions, followed by electricity generation (24%), industrial (21%), residential (6%), agriculture and forestry (6%), and other sources (6%) (CARB 2010).

3.3.4 Impact Analysis

Methodology

This section describes the methods used to determine the Proposed Project's impacts related to GHG emissions. The impacts related to emissions of GHGs from the Proposed Project were evaluated quantitatively for commercial fishing vessels and qualitatively for recreational fishing vessels. Methods to evaluate both commercial and recreational fishing vessels are discussed below.

Commercial Fishing Vessels

The creation of a network of marine protected areas (MPAs) in the Study Region would restrict commercial fishing activities in certain areas. In response to restrictions within the MPAs, commercial fishing vessels would either transit to different locations to fish in unrestricted areas outside of MPA boundaries, or stop fishing altogether. This analysis assumes that commercial fishing vessels travel just beyond an MPA and continue fishing, resulting in slightly longer distances traveled. The increased time required to travel longer distances would increase the duration of combustion activities and increase associated emission of GHGs, compared with existing conditions. This assessment quantifies only those GHG emissions resulting from the displacement of commercial fishing trips, or in other words the increment of emissions resulting from increased travel distances and times. This analysis does not quantify emissions from existing vessel trips, as these trips currently

occur outside of the actions proposed by the Proposed Project and are considered part of the baseline conditions. GHG emissions from displacement were calculated using data of commercial fishing vessel activity and energy-based emission factors.

Data for all commercial fishing vessel activity (excluding commercial passenger fishing vessels (CPFVs) from 2007 and 2008[1] in the Study Region was obtained from the Department. The data set was filtered to include only commercial fishing trips that occurred in a fishing block containing all or a portion of a Study Region MPA. Filtering the data set in this manner limited vessel trips to those potentially displaced by MPAs. This includes vessels from the Eureka and North Fort Bragg Port Complexes, as well as vessels from outside of the Study Region, such as Oregon or the San Francisco Bay area. Vessel trips within the Study Region that are not currently destined to a fishing block with an MPA were excluded from this analysis, as they do not have the potential to be displaced.

Commercial fishing effort was assumed to be uniform throughout each fishing block, though MPAs cover only a portion of each fishing block. Therefore, the quantity of displaced vessel trips within each fishing block was assumed to be equivalent to the percentage of fishing block area covered by an MPA. For example, where an MPA would cover ten percent of the area of a fishing block, it was assumed that ten percent of the trips to that fishing block would be displaced, and the additional emissions from those displaced vessels were modeled in this analysis. Displaced vessel trips were assigned to either the NCUAQMD or the MCAQMD. Since it was assumed that vessels would transit additional distances in the proximity to MPAs, vessel trips were assigned to an AQMD based on the location of the fishing block (i.e., trip destination) with respect to the boundaries of the AQMDs. For each AQMD, average daily and maximum annual GHG emissions were calculated.

The emissions model was derived from the USEPA's *Current Methodologies and Best Practices in Preparing Port Emissions Inventories* (ICF Consulting 2006), and used the following equation:

Emissions (grams) = **P x LF x A x EF**

Where **P** = Maximum Continuous Rating Power (kilowatts [kW])

LF = Load Factor (percent of vessel's total power)

A = Activity (hours)

EF = Emission Factor (grams per kilowatt-hour [g/kWh])

GHG emissions were calculated for each displaced vessel trip. Each vessel's maximum continuous power was available for each vessel in the data set. For the load factor, it was assumed that ships would be traveling at service or cruise speed. The activity duration used for this analysis was equivalent to the increased duration of vessel transit resulting from displacement. It was assumed that on average each vessel would transit an additional distance equal to the along-shore distance of an MPA. To estimate the increased activity duration, it was considered that each vessel would travel "out and back" to avoid fishing in an MPA, at an average vessel speed of 18 miles per hour (average cruise speed [ICF

[1] As noted in Section 3.2 "Air Quality," for consistency with data years in other chapters of this EIR and in Appendix B, the same years were used in this analysis. No dramatic changes in fishing regulations have occurred since 2008, and thus the patterns are expected to reasonably approximate more recent trends.

Consulting 2006]). The one-way displaced along-shore distance for each vessel was estimated as the average MPA distance within each AQMD. Accordingly, within the NCUAPCD, the average along-shore distance is estimated to be 2.8 statute miles (mi); within the MCAPCD, the average along-shore distance is estimated to be 2.45 mi.

Aggregate GHG emissions are reported in this analysis as CO_2e, although for each vessel, emissions were initially calculated for specific GHGs: CO_2, CH_4, and N_2O. Energy-based GHG emission factors were calculated for use in this analysis, as shown in **Table 3.3-1**.

Table 3.3-1. Greenhouse Gas Emissions Factors

Minimum Vessel Horsepower (hp)	Emissions Factor (grams/hp)		
	CO_2	N_2O	CH_4
50	25,375	0.65	2
100	50,750	1.3	4
175	88,812	2.2	7
300	152,250	3.9	12
600	304,500	7.8	24
750	380,625	9.8	30
1,341	680,557	17.4	53.6

Notes: CO_2 = carbon dioxide, N_2O = nitrous oxide, CH_4 = methane

Source: Data compiled by Horizon Water and Environment 2011

Recreational Vessels

Recreational vessels include CPFVs, private recreational fishing vessels, and other craft used solely for the purposes of recreational activities, such as boats for scuba diving and sailing boats. Of all types of recreational vessels, the Proposed Project would be expected to primarily affect trips related to consumptive recreational activities, including CPFVs and other recreational fishing vessels.

A qualitative assessment of potential increased criteria air pollutant emissions from displacement of recreational vehicles has been provided because the available data on recreational vessel use is limited. Although a substantial number of noncommercial vessels are located within the Study Region, detailed data on recreational vessel use, such as that collected for commercial vessel activity (above), is not available. The data collected by the Department includes information related to CPFVs, but not for other private recreational vessels. Information on the location of these other recreational vessels, the number of trips taken, the purpose of trips, and the types of fuel and engines used by these boats is not feasible to obtain. Thus, any attempt to produce an emissions estimate would require a number of speculative assumptions. Because the Regional Profile shows that the majority of recreational vessel trips between 2005 and 2008 were overwhelmingly private boats, using the data for CPFVs to estimate the overall level of recreational vessel emissions would be inaccurate.

This analysis assumes that displaced recreational fishermen will travel longer distances with greater travel times to new destinations. It was assumed that on average, each vessel would transit an additional distance equal to the along-shore distance of an MPA.

Criteria for Determining Significance

Using the significance criteria from Appendix G of the State CEQA Guidelines and professional expertise, the Proposed Project would have a significant impact on GHG emissions if it would:

A. generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or

B. conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

As described above, the MCAQMD has adopted the BAAQMD CEQA thresholds of significance. The NCUAQMD does not have published CEQA guidelines and has established significance thresholds only for major stationary sources, but not mobile sources. For the purposes of this analysis, we have applied the BAAQMD CEQA thresholds of significance to the NCUAQMD air basin. Air quality with the portion of the NCAB managed by NCUAQMD is potentially dissimilar to air quality in the San Francisco Bay Area Air Basin because of different climatic, topographic, and other conditions. However, the BAAQMD CEQA thresholds represent the best available published thresholds for evaluating GHG emissions in this region for the purposes of CEQA. **Table 3.3-2** below shows the BAAQMD CEQA thresholds for GHG emissions from nonstationary (mobile) sources.

Table 3.3-2. Applicable BAAQMD CEQA Thresholds of Significance for Greenhouse Gases

Pollutant	Operational Significance Thresholds
GHGs—projects other than stationary sources	a) Compliance with qualified GHG-reduction strategy, **OR** b) 1,100 metric tons (MT) of carbon dioxide equivalent (CO_2e) per year, **OR** c) 4.6 MT CO_2e/service population (residents and employees) per year

Note: GHG = greenhouse gas
Source: BAAQMD 2011

Environmental Impacts

Impact GHG-1: Increased Emissions of Greenhouse Gases from Vessel Displacement (Significance Criterion A)

Commercial Vessel Displacement

As discussed under "Methodology" above, displacement of commercial fishing vessels could increase the distance and duration of vessel transit, resulting in increased GHG emissions.

Table 3.3-3 shows the average daily and maximum annual GHG emissions for commercial fishing vessels by AQMD, based on the methodology outline above. The maximum annual GHG emissions for commercial vessels are 0.73 metric tons of CO_2e per year in NCAQMD and 7.5 metric tons of CO_2e per year in MCAQMD. Table 3.3-3 also demonstrates that maximum annual emissions are substantially lower than the BAAQMD annual threshold of 1,100 metric tons of CO_2e per year. The data used from 2007 and 2008 indicates that the vast majority (approximately 95%) of vessel trips potentially displaced as a result of the proposed MPAs would occur south of the northern Mendocino County boundary. As a result, a much larger quantity of GHG emissions from vessel displacement would occur within the jurisdiction of MCAQMD than NCUAQMD.

Table 3.3-3. Average Daily and Maximum Yearly CO_2e Emissions from Commercial Vessel Displacement

Jurisdiction/Geography	Average Daily Emissions (kg/day)	Maximum Annual Emissions (metric tons/year)
North Coast Unified AQMD	12.3	0.7
Mendocino County AQMD	29.4	7.5
Total North Coast Air Basin	*41.7*	*8.2*
BAAQMD Threshold	None	1,100

Note: AQMD = Air Quality Management District, BAAQMD = Bay Area Air Quality Management District, kg/day = kilogram per day

Data from commercial vessel trips from 2007 and 2008. Maximum annual emissions are from 2008, which had greater GHG emissions than 2007 in both AQMDs.

Source: Data compiled by Horizon Water and Environment in 2011

Recreational Vessel Displacement

As discussed under "Methodology" above, displacement of recreational fishing vessels used for consumptive and nonconsumptive activities could increase the distance and duration of vessel transit, resulting in increased GHG emissions. As there is limited useful data available on recreation vessel trips, this displacement cannot be quantified.

As documented in the Regional Profile, both shore-based and boat-based modes are common for recreational fishing in the Study Region. Boat-based modes of recreational fishing include CPFVs, private and rental boats, and kayaks. The Regional Profile shows that the majority of recreational vessel trips between 2005 and 2008 were overwhelming private boats. It is expected that private and rental boats use less energy and have less power than commercial fishing vessels, and would emit slightly less GHG emissions per displaced trip. Some recreational vessels, such as kayaks, have no engines and would not emit GHG emissions.

Overall, it is expected that displacement of recreational vessels would be less than or, at most, equal to commercial fishing vessel displacement. This would result in emissions of GHGs less than or, at most, equal to those from commercial fishing vessels.

Aggregate Displacement

Future commercial and recreational vessel trips within the Study Region could increase compared with 2007 and 2008 data used in this analysis. Seasonal fluctuations in fishing restrictions influence the number of vessel trips in a given year. For instance, in 2007 and 2008, salmon fisheries were closed to commercial fishing, but have since reopened. As a result, it is expected that current commercial vessel trips are greater than in 2007 and 2008. In addition, population growth over the next several decades is likely to result in greater demand for ocean fish commodities in the Study Region. To meet increased demand, an increase in commercial fishing activity is possible.

This overall increase in the number of annual commercial and recreational vessel trips would likely increase vessel displacement and GHG emissions from the Proposed Project. This includes both average daily and maximum annual emissions within the NCUAQMD and the MCAQMD. Even if daily and annual GHG emissions within each of these jurisdictions, compared with the emissions presented on Table 3.3-3, were to double or triple to account for larger amounts of displacement and/or recreational trips, GHG emissions would still be well below BAAQMD thresholds for GHG emissions (refer to Table 3.3-3). In fact, the increase in emissions would need to be several orders of magnitude larger than has been estimated before the threshold would be exceeded. Specifically, the increased emissions from displaced recreational trips would need to be more than 133 times greater than those resulting from displaced commercial trips before a BAAQMD threshold would be surpassed. On this basis, increased GHG emissions from commercial and recreational fishing-vessel displacement, including any future increase in overall vessel trips, are exceedingly unlikely to exceed BAAQMD thresholds for GHG emissions. Therefore, increased GHG emissions from displacement of vessels would be a less-than-significant impact.

Level of Significance: *Less than Significant*

Impact GHG-2: Conflict with or Obstruct Implementation of a Greenhouse Gas Reduction Plan (Significance Criterion B)

The establishment of a network of MPAs along the North Coast could increase GHG emissions as a result of the increased transit distances and times for commercial and recreational fishing vessels, as described in Impact GHG-1 above. However, the quantity of GHG emissions from commercial vessels would be much smaller than established thresholds of significance for GHG emissions. In addition, no plans, policies, or thresholds have been established for the purpose of reducing GHG emissions in the Study Region or in California's offshore areas. Therefore, the Proposed Project is not anticipated to conflict with or obstruct implementation of any GHG-reduction plans, and impacts from the Proposed Project would be less than significant.

Level of Significance: *Less than Significant*

Chapter 3.4

Water Quality

3.4 Water Quality

3.4.1 Introduction

This section describes the environmental and regulatory setting for water quality, and the potential impacts on water quality that could result from the Proposed Project. The following discussion describes the overall regulatory framework for water quality management in California and the North Coast Study Region (Study Region), and existing water quality conditions. Data and information sources used to prepare this section include state and federal regulations, the *Regional Profile of the North Coast Study Region: California-Oregon Border to Alder Creek* (MLPAI 2010), and reference materials from the State Water Resources Control Board (SWRCB).

3.4.2 Regulatory Setting

Numerous federal and state laws, regulations, and policies are designed to protect water quality in and adjacent to the Study Region. These laws, regulations, and policies are summarized below; federal requirements are described first, followed by state requirements.

Federal Law, Regulations, and Policies

Clean Water Act

The federal Water Pollution Control Act of 1972 (Title 33, Section 1251 and subsequent sections of the U.S. Code [33 USC 1251 et seq.]), also known as the Clean Water Act (CWA), is the principal statute governing water quality. The goal of the CWA is to restore and maintain the chemical, physical, and biological integrity of U.S. waters. The CWA regulates both the direct and indirect discharge of pollutants into the nation's waters. Sections of the CWA that may be applicable to the Proposed Project are as follows:

- **Section 301** prohibits the discharge into navigable waters of any pollutant by any person from a point source unless it is in compliance with a National Pollution Discharge Elimination System (NPDES) permit.
- **Section 311** regulates the discharge of oil and other hazardous substances into navigable waters and waters of the contiguous zone, as well as onto adjoining shorelines, that may be harmful to the public or to natural resources. The CWA allows the federal government to remove the substance and assess the removal costs against the responsible party. Under the CWA, removal costs include those associated with the restoration or replacement of the natural resources damaged or destroyed as a result of a discharge of oil or a hazardous substance.
- **Section 316(b)** requires that the location, design, construction and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impacts.
- **Section 319** addresses nonpoint sources of pollution. The 1987 amendments to the CWA authorized measures to address such pollution by directing states to develop and implement nonpoint pollution management programs. States were

encouraged to pursue groundwater protection activities as part of their overall nonpoint pollution control efforts.

- **Section 401** mandates projects that involve discharge or fill to wetlands or navigable waters to obtain certification of compliance with state water quality standards.
- **Section 402** establishes the NPDES permit program. The NPDES program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or human-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. Permits typically are issued by a state agency (in California, the SWRCB and its nine Regional Water Quality Control Boards [RWQCBs]), and cannot exceed 5 years in duration. The responsibility for permit compliance enforcement is shared between the state and the federal government.
- **Section 404** authorizes the U.S. Army Corps of Engineers (USACE) to issue permits for the disposal of dredged and fill material into navigable waters.

Rivers and Harbors Act

The federal Rivers and Harbors Appropriation Act (RHA) of 1899 (33 USC Section 403; Chapter 425, March 3, 1899; 30 Stat. 1151), commonly known as the Rivers and Harbors Act of 1899), regulates development and use of the nation's navigable waterways. It prohibits the unauthorized obstruction or alteration of any navigable waters of the U.S. As defined by the RHA, navigable waters include all waters that are:

- subject to the ebb and flow of tides; and/or
- presently, historically, or potentially used for foreign or interstate commerce.

Specifically, the RHA regulates:

- construction of structures in, under, or over navigable waters;
- excavation or deposition of material in navigable waters; and
- all work affecting the course, location, condition, or capacity of navigable waters.

The RHA is administered by the USACE, typically in conjunction with Section 404 of the CWA. If a proposed activity falls under the authority of both CWA Section 404 and RHA Section 10, the USACE processes and issues a single permit. For activities regulated only under RHA Section 10, such as installation of a structure not requiring fill, permit conditions may be added to protect water quality during construction.

Coastal Zone Management Act

The purpose of the federal Coastal Zone Management Act of 1972 (16 USC 1451–1464) is to preserve, protect, and restore or enhance the nation's coastal zones. California has enacted

the federally approved California Coastal Act (see below under "State Law, Regulations, and Policies").

Ocean Dumping Act

The federal Marine Protection, Research, and Sanctuaries Act of 1972 (33 USC 1401 et seq.), also referred to as the Ocean Dumping Act, regulates the dumping of waste into ocean waters, provides for a research program on ocean dumping, and dictates the designation and regulation of marine sanctuaries. It regulates the ocean dumping of all material beyond the territorial limit (3 statute miles [mi] from shore) and prevents or strictly limits dumping material that "would adversely affect human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities."

State Law, Regulations, and Policies

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Act provides the state with broad jurisdiction over water quality and waste discharge, and also provides the state with the authority to prepare regional water quality control plans (basin plans) to protect the state's water resources. Under the Porter-Cologne Water Quality Control Act and Section 401 of the federal CWA, the SWRCB and the RWQCBs regulate discharges to surface waters (including wetlands), groundwater, and point and nonpoint sources of pollution.

Included under the umbrella of the SWRCB are nine regional boards throughout the state, each of which monitors a separate SWRCB region. The North Coast RWQCB manages Region 1, which includes the North Coast Basin and the Klamath River Basin. This regional board extends from the California/Oregon border to the mouth of Tomales Bay (Marin County), encompassing state waters in and adjacent to the Study Region (North Coast RWQCB 2011).

The RWQCBs' permit authority includes the issuance of waste discharge requirements and conditions on CWA Section 401 water quality certification authorizations. Water quality objectives for surface waters are established in Water Quality Control Plans (Basin Plans) by each RWQCB. The standards represent maximum levels of pollutants, or acceptable ranges (for parameters such dissolved oxygen, temperature or pH) that allow beneficial uses of the water basin to continue unimpaired. The RWQCB has primary authority for ensuring that regional water resources are protected from degradation by pollutant discharges. To develop water quality standards that are consistent with the uses of a water body, each RWQCB attempts to classify historical, present, and future beneficial uses of the waters under its jurisdiction as part of the Basin Plan for its region. The Basin Plan is periodically reviewed and updated. Finally, each RWQCB is required to identify water bodies that do not meet water quality objectives, pursuant to CWA Section 303(d).

The RWQCBs regulate all nonpoint source discharges under one of two statutory requirements: the NPDES stormwater permitting program and the Coastal Nonpoint Pollution Control Program. The CWA Section 402 program is designed to regulate stormwater and urban runoff (i.e., the nonpoint source discharges that become point sources). Virtually all other nonpoint sources are subject to the Coastal Nonpoint Pollution Control Program.

When a water body does not meet established water quality standards, it is placed on an impaired waters list, mandated by CWA Section 303(d). For this reason, this list is often called the 303(d) list, and waters on this list are referred to as "impaired" waters. States are required to update this list every 2 years and work towards resolving problems associated with the listed water bodies. Typically, a total maximum daily load (TMDL) is developed for each impaired water body. A TMDL determines the total amount of the pollutant/stressor, such as pathogens, sediment, and nutrients, that the water body can receive and still meet water quality standards. An implicit or explicit margin of safety also is factored into this analysis. The TMDL then allocates the allowable loading to all point and nonpoint sources to the water body and establishes an implementation plan to ensure that the allocations and water quality standards are achieved (MLPAI 2010).

California Coastal Act

The California Coastal Act (Coastal Act) was enacted by the California State Legislature in 1976 to provide long-term protection of California's 1,100-mi coastline for the benefit of current and future generations. The Coastal Act created a partnership between the state (acting through the California Coastal Commission [CCC]) and local government to manage the conservation and development of coastal resources through a comprehensive planning and regulatory program. CCC implements Coastal Act policies that address issues such as public access and recreation, natural resource protection, agricultural operation, coastal development projects, port activities, and energy production. Development activities, including the construction of buildings, divisions of land, and activities that change the intensity of land use or public access to coastal waters, generally require a coastal permit from either the Coastal Commission or the local government (California Coastal Commission 2011).

Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling

The SWRCB adopted a policy for CWA Section 316(b) in July 2011, Use of Coastal and Estuarine Waters for Power Plant Cooling. This policy establishes technology-based standards to implement CWA Section 316(b) and reduce the harmful effects associated with cooling water intake structures on marine and estuarine life. The policy applies to the 19 existing power plants in California (including two nuclear plants) that currently have the ability to withdraw over 15 billion gallons per day from the state's coastal and estuarine waters, using once-through cooling systems. Of these 19, only the Humboldt Bay Power Plant (HBPP) is located immediately adjacent to the Study Region.

California Ocean Plan

The Water Quality Control Plan for Ocean Waters of California (California Ocean Plan) was prepared by the SWRCB in 1972. It is regularly updated and was most recently reviewed in 2009 (SWRCB 2009). This plan establishes water quality standards for ocean waters, and the requirements and management of waste discharge to the ocean. The plan also identifies specific beneficial uses, water quality objectives, effluent limitations, monitoring program requirements, and regulation of Areas of Special Biological Significance (ASBS). The plan provides the basis for regulation of wastes discharged into the state's coastal waters and applies to both point and nonpoint source discharges. The SWRCB and the six coastal

RWQCBs are responsible for reviewing the plan's water quality standards, and for modifying and adopting standards, in accordance with CWA Section 303(c)(1) and California Water Code Section 13170.2. The plan identifies beneficial uses of California's ocean waters that are to be protected, including: industrial water supply; water contact and noncontact recreation, including aesthetic enjoyment; navigation; commercial and sport fishing; mariculture; preservation and enhancement of designated ASBS; rare and endangered species; marine habitat; fish migration; fish spawning; and shellfish harvesting.

Thermal Plan

The Water Quality Control Plan for Control of Temperature in Coastal Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan), which was adopted by the SWRCB on January 7, 1971, and revised most recently on September 18, 1975, provides the state with specific water quality objectives for cold and warm interstate waters, coastal waters, enclosed bays, and estuaries. The SWRCB and the RWQCBs administer this plan by establishing waste discharge requirements for existing and future discharges of elevated temperature wastes. Existing and future dischargers of thermal waste are required to conduct studies to define the effect of the discharge on beneficial uses and, for existing discharges, determine design and operating changes necessary to achieve compliance with the provisions of the Thermal Plan. The RWQCBs may, in accordance with CWA Section 316(a) and subsequent federal regulations including Title 40, Code of Federal Regulations (CFR) Part 122, grant an exception to the specific water quality objectives in the plan.

Enclosed Bays and Estuaries Plan

The Water Quality Control Plan for Enclosed Bays and Estuaries (Enclosed Bays and Estuaries Plan) sets forth objectives for the protection of aquatic life and human health. This plan applies to discharges of toxic pollutants into inland surface waters, enclosed bays, and estuaries of California that are subject to regulation under the Porter-Cologne Water Quality Control Act and the federal CWA. Such regulation may occur through the issuance of NPDES permits, the issuance or waiver of waste discharge requirements (e.g., for discharges of treated wastewater to land), or other relevant regulatory approaches. The goal of this policy is to establish a standardized approach for permitting discharges of toxic pollutants to non-ocean surface waters, in a manner that promotes statewide consistency. The policy is intended as a tool to be used in conjunction with watershed management approaches and, where appropriate, the development of TMDLs to ensure achievement of water quality standards (i.e., water quality criteria or objectives, and the beneficial uses they are intended to protect, as well as state and federal anti-degradation policies). This policy establishes implementation provisions for priority pollutant criteria that is promulgated by the U.S. Environmental Protection Agency (USEPA) through the National Toxics Rule (NTR) (40 CFR 131) and through the California Toxics Rule that is the basis for the NTR, and for priority pollutant objectives established by the RWQCB in each basin plan.

State Water Quality Protection Areas—Areas of Special Biological Significance

ASBS were intended to afford special protection to marine life through prohibition of waste discharges within these areas. The RWQCBs were required to select areas in coastal waters that contain "biological communities of such extraordinary, even though unquantifiable,

value that no acceptable risk of change in their environments as a result of man's activities can be entertained." Since 1983, the California Ocean Plan has prohibited waste discharges to ASBS. Similar to previous versions of the plan, the 2009 California Ocean Plan (SWRCB 2009) states: "Waste shall not be discharged to areas designated as being of special biological significance. Discharges shall be located a sufficient distance from such designated areas to assure maintenance of natural water quality conditions in these areas." Of the 34 ASBS statewide, four are located in the Study Region (**Table 3.4-1**). However, none of the proposed MPAs overlap with an ASBS.

Table 3.4-1. Areas of Special Biological Significance in the North Coast Study Region

ASBS Site	Area (mi^2)	Nearby Marine Protected Areas
Jughandle Cove	0.32	MacKerricher SMCA
Trinidad Head	0.46	Samoa SMCA
King Range	39.15	Mattole Canyon SMR, Sea Lion Gulch SMR, Big Flat SMCA
Redwood National Park	97.26	Reading Rock SMR, Reading Rock SMCA

Notes: ASBS = Areas of Special Biological Significance, mi^2 = square statute mile(s), SMCA = state marine conservation area, SMR = state marine reserve

All the ASBS sites listed are also state water-quality protection areas.

Source: MLPAI 2010

State Laws Relating to Vessel Abandonment

Vessel abandonment is illegal in California, and the Legislature has passed multiple bills to address the issue of vessel abandonment. Abandoned vessels contaminate water quality, influence wildlife, create unsafe hazards, and create visual blight on the landscape. The Abandoned Watercraft Abatement Fund Grant Program (AWAF) was created in 1997 by the Legislature to address abandoned vessels. This grant program provides funds to local agencies to reimburse the removal of abandoned vessels from waterways under an agency's jurisdiction, but the funds are applicable only to recreational vessels (National Sea Grant Law Center 2009). In 2005, the California Legislature passed AB 716, which allowed vessels with registrations expired for more than one year to be removed from a public waterway by law enforcement officers. AB 716 also increased the maximum penalty for abandoning a vessel to $3,000 and allowed courts to require violators to pay the actual costs of removal and storage in addition to the fine. AB 166, signed into law in 2009, created a statewide vessel turn-in program for unwanted boats and increased the penalty for vessel owners caught abandoning boats in California waterways. The vessel turn-in program allows owners of unwanted boats to give vessels to a public agency for disposal, rather than abandoning them. Funding for the vessel turn-in program comes from the AWAF.

3.4.3 Environmental Setting

Many water quality associations exist between coastal watersheds and coastal and marine waters. In particular, episodic and seasonal factors influence terrestrial input to marine environments. In the Study Region, nutrient loading from terrestrial sources can be

significant at local scales, especially during low flow periods and first flush events. Substantial net export from rivers and estuaries to the ocean usually occurs during the rainy season (November through March) and primarily during storm events (MLPAI 2010).

The type and intensity of land-sea interactions vary greatly in coastal regions, depending on a unique combination of factors. Abiotic factors include climate, geomorphology, and ocean currents, and biotic factors include land use and other activities. These complex interactions at the land-sea interface can be beneficial (e.g., critical riverine and estuarine nursery habitats for coastal marine and anadromous species) or detrimental (e.g., point and nonpoint sources of pollution) (MLPAI 2010).

Four main classes of land-sea interaction need to be considered when examining the effects of land use on the marine ecosystems of the Study Region (MLPAI 2010):

- watershed processes and the export of sediment and materials of terrestrial origin to estuaries and the ocean (particularly nutrients, persistent toxic chemicals, and pathogens);
- sediment input from coastal erosion, landslides, and disposal;
- use of land and streams by marine-dependent species (e.g., steelhead migrations, harbor seal haul outs, and sea bird rookeries); and
- socioeconomic interactions between land and sea at the coastal margin, where degraded water and sediment quality (e.g., leading to beach closures or seasonal bans) may affect ecotourism and management of environments.

These four classes of land-sea interactions specifically affect nearshore and estuarine-dependent species and habitats as well as marine species that spend some portion of their life cycles on land or freshwater. Impacts on coastal watersheds have repercussions for the entire coastal ecosystem. Estuaries and bays are particularly vulnerable to development, pollution, and the introduction of invasive species. (MLPAI 2010)

Coastal Water Quality

The federal CWA, Rivers and Harbors Act, Coastal Zone Management Act, and Ocean Dumping Act, and California's Porter-Cologne Water Quality Control Act, the California Ocean Plan, the Thermal Plan, the Enclosed Bays and Estuaries Plan, and ASBS regulations establish water quality standards for all of the Study Region's coastal, bay, lagoon and estuarine waters.

In addition, the Yurok Tribe Environmental Program monitors water quality, including discharge, turbidity, conductivity, and temperature at over 20 stations in the Lower Klamath River Hydrologic Area. The objectives of this long-term monitoring program are to establish baseline conditions, assess long-term trends, provide flow regimes as related to fisheries, and monitor long-term restoration projects (MLPAI 2010).

Factors affecting coastal water quality are discussed in more detail next.

Coastal Watersheds and Land Use

The California Department of Water Resources identifies surface waters by hydrologic units, areas, and subareas. Specifically, hydrologic units are defined as surface drainage divides, which include the total watershed area, both water-bearing and non-water-bearing formations, and two or more small contiguous watersheds with similar hydrologic characteristics draining from one mountain body. The Study Region extends for approximately 517 mi along the Californian shoreline, includes 1,027 square statute miles (mi^2) of ocean, and10,000 mi^2 from the 19 hydrologic units or major watersheds drain to this area (MLPAI 2010).

A variety of land uses can have negative impacts on adjacent coastal and estuarine water, including urban and rural developments, agriculture, timberlands, commercial, and industrial. Impacts of land use on water quality may include, but not be limited to, nutrient loading and associated eutrophication, runoff, siltation, habitat loss, and decrease in fish populations. However, other land uses, such as open space, can serve as a buffer and reduce terrestrial impacts on nearby water bodies.

Point Sources

Specific locations, or point sources, where industrial pollution enters coastal waters generally are regulated by state or federal agencies. These point sources include municipal wastewater treatment and disposal systems and industrial sites, such as desalination plants, power plants, aquaculture sites, and research marine laboratories. Seven municipal wastewater treatment plants, one power plant, and three other permitted pollution discharge sites are located adjacent to the Study Region, and their effluents include marine lab waste seawater, sawmill wastewater, and fish offal from a fish cleaning station (**Table 3.4-2**). Additional wastewater and power plant discharge sites are located more inland, along rivers that drain into the Study Region. However, because these discharges are not directly within the Study Region, they are not included in Table 3.4-2.

Table 3.4-2. Pollutant Point Sources in the North Coast Study Region

Point Source	Effluent	Nearby Marine Protected Areas
Municipal Wastewater Treatment Facilities		
City of Crescent Publicly Owned Treatment Works	Treated sanitary wastewater	Point St. George Reef Offshore SMCA
City of Arcata Wastewater Treatment Plant	Treated sanitary wastewater	South Humboldt SMRMA, Samoa SMCA
City of Eureka Elk River Wastewater Treatment Plant	Treated sanitary wastewater	South Humboldt SMRMA, Samoa SMCA
Shelter Cove Publicly Owned Treatment Works	Treated sanitary wastewater	Big Flat SMCA
Fort Bragg Wastewater Treatment Plant	Treated sanitary wastewater	MacKerricher SMCA
Municipal Wastewater Treatment Facilities		
Mendocino City Community Services District	Treated sanitary wastewater	Big River Estuary SMCA, Russian Gulch SMCA

Table 3.4-2. Pollutant Point Sources in the North Coast Study Region

Point Source	Effluent	Nearby Marine Protected Areas
Industrial-Power Plants		
Humboldt Bay Power Plant	Cooling water	South Humboldt Bay SMRMA
Other Industrial Discharge Sites		
California State University Humboldt Marine Lab	Marine lab waste seawater	South Humboldt SMCA, Samoa SMCA
Sierra Pacific Industries Arcata Division Sawmill	Industrial wastewater	South Humboldt SMCA, Samoa SMCA
Humboldt Bay Recreation District Fish Cleaning Station at Shelter Cove	Fish offal	South Humboldt SMCA, Samoa SMCA

Notes: SMCA = state marine conservation area, SMRMA = state marine recreational management area

Source: MLPAI 2010

Stormwater Discharge

Outfalls for untreated stormwater are another kind of point source. The discharge from stormwater outfalls may contain a variety of pollutants, such as bacteria, trash, petroleum hydrocarbons, and heavy metals. These outfalls exist throughout the Study Region. For example, in the City of Eureka, there are 17 storm drain outfalls located on Humboldt Bay and the surrounding sloughs. Although stormwater outfalls are considered a point source, they are closely related to nonpoint source pollution, discussed in the following section (MLPAI 2010).

Nonpoint Sources

Nonpoint source pollution is the leading cause of degraded water bodies in northern California and across the country. Unlike point sources, nonpoint source pollution is difficult to control and address because it derives from many diffuse sources. In the Study Region, nonpoint source pollution occurs when rain causes runoff to move over the land, pick up and transport pollutants, and deposit them into surface waters including estuaries and coastal and marine waters. Among many other substances, common nonpoint source pollutants are sediment, pesticides, fertilizers, trash, salt, oils, heavy metals, grease, bacteria, and nutrients. The five major categories of nonpoint pollution sources are: 1) agriculture, 2) forestry operations, 3) urban, 4) hydrologic modification, and 5) marinas and recreational activities. These sources are described next.

Agriculture. The agriculture industry is an essential part of California's economy. The primary crops grown adjacent to the Study Region are nursery plants, milk and milk products, livestock, fruits, nuts, and vegetables. The nonpoint source pollution typically associated with agriculture includes nutrients, animal waste, sediments, and pesticides that enter receiving waters by direct runoff to surface waters or seepage into groundwater. These pollutants may degrade aquatic habitats by causing eutrophication, turbidity, temperature increases, toxicity, and decreased oxygen. Agricultural activities are regulated by state and regional water quality control boards, through point source and nonpoint source programs. To help address water quality issues related to agriculture, the RWQCBs work with local governments to promote incorporation of best management practices.

These measures, along with small grants, are part of an incentive approach to encourage growers to reduce runoff and conserve water.

Forestry Operations. Forestry operations are extensive adjacent to the Study Region and may cause erosion, thus increasing sediment concentrations in receiving waters. Other impacts of forestry operations may include increasing water temperatures because of removal of overstory riparian shade, depleting dissolved oxygen because of organic debris, and increasing concentrations of organic and inorganic chemicals because of harvesting, fertilizers, and pesticides. Forestry operations adjacent to the Study Region mostly occur in the form of commercial logging and timberland use conversions. Geologic instability and high precipitation rates, concentrated over a few months of the year, create periods of naturally high erodibility. When combined with forestry operations, the resulting sedimentation and temperature changes in rivers, streams, and creeks may have detrimental effects on coho salmon and steelhead trout populations. Many coastal streams adjacent to the Study Region are impaired by sedimentation or temperature, particularly the Mattole, Eel, Mad, and Ten Mile rivers (MLPAI 2010).

Urban Areas. Compared to other regions in California, the North Coast is largely undeveloped. Where urbanization occurs, however, the modification to the land surface caused by development affects runoff magnitude and type of runoff pollutants. Urban areas include buildings, roads, parking lots, and other residential, industrial, or commercial paved surfaces. Replacement of natural land cover with impervious surfaces increases stream channel erosion, flooding, water contamination, sedimentation, and degradation of aquatic habitat. This may result in increased runoff as well as higher concentrations of harmful pollutants within runoff. The pollutants commonly found in urban runoff are sediment, nutrients, plastics, viruses, pathogenic bacteria from sewer overflows and failing domestic wastewater systems, heavy metals from leaking automobiles and metal pipes, pesticides, and petroleum hydrocarbons from leaking automobiles, minor spills, and roads. Smaller municipalities and road construction also generate urban nonpoint source pollution (MLPAI 2010).

Hydrologic Modification. Floodplains collect water traveling down the watershed and reduce flows. As a result, water and pollutants have the opportunity to settle out and infiltrate into the soil. They serve as natural buffers by removing suspended solids and contaminants from the water. In urban settings, where the flood protection services of floodplains are lost, hydrologic modifications are used in lieu of the natural feature. In general, hydrologic modifications are designed to control water flow. A number of activities fall within the category of hydrologic modifications, such as alteration of stream and river channels, installation of dams and water impoundments, and dredging. Although these modifications are intended to enhance urban flood protection, they can degrade water quality. Hydrologic modification can alter water temperature and sediment transport, and thus reduce the quality of aquatic habitats (MLPAI 2010).

Ports, Harbors, Marinas, and Associated Vessels. Marinas and other embayments, along with associated vessels, can have adverse impacts on water quality, as most pollutants are directly discharged into the water. In the Study Region, recreational boating is an important activity with social and economic benefits, and pleasure boats make up 97% of the vessels in the Study Region (see Section 6.5, "Vessel Traffic"). Boating-related activities also can cause water pollution from antifouling paint, sewage, fuel spills, wastewater, and trash.

Antifouling paint used on boat hulls to reduce fouling growth contains harmful chemicals, such as copper and lead. These chemicals can have adverse effects on aquatic species, particularly mussels and sea urchins, by impeding growth, reproduction, spawning, eating, and survival. Efforts are in place to encourage a transition to use of nonmetal, antifouling paints. In addition, the SWRCB is developing a Coastal Marinas General Permit, to establish minimum statewide waste discharge requirements for marinas (MLPAI 2010).

Commercial vessels, such as ferries, tugs, crew and supply boats, commercial fishing vessels, and boats for charter fishing and other excursions, are another potential source of pollution. In 2007, roughly 220 commercial fishing vessels identified the Humboldt Bay port complex as home port (see Section 6.5, "Vessel Traffic"). In 2008, over 300 commercial vessels were registered in northern California. The historical number of oil spills along the Pacific Coast is small, but the potential size and impact of such a spill on the marine environment could be significant (MLPAI 2010).

Impaired Water Bodies in the North Coast Study Region

Based on the most current list of impaired waters from 2010, 39 water bodies draining to the Study Region are designated as impaired. Illustrative examples of water bodies for which TMDLs have been established include the following:

- **Eel River:** Fourteen impaired bodies of water are associated with the Eel River Hydrologic Unit, including the Middle Fork, South Fork, and North Fork Hydrologic Areas (and the tributaries to these areas) (SWRCB 2010). The Eel River flows from southeastern Mendocino County through southern Humboldt County, to the Eel River Delta located 10 mi south of Humboldt Bay. Its watershed provides habitat for fish and wildlife, including threatened or endangered salmonids. People use the watershed for municipal, agricultural, and recreational purposes. The Eel River has a TMDL listing for temperature and sedimentation/siltation. The temperature impairment stems from channelization, removal of riparian vegetation, habitat modification, and unspecified nonpoint sources. A number of factors contribute to the sedimentation and siltation impairment, including construction, land development, range grazing of riparian and upland habitats, silviculture, logging road construction and maintenance, and unspecified nonpoint sources (MLPAI 2010).
- **Redwood Creek:** The mouth of Redwood Creek is located about 8 mi south of the Humboldt/Del Norte County border and is listed as a TMDL site for temperature and sedimentation/siltation. Timber harvesting, road building, grazing, and the construction of levees in the lower 3.5 mi of the creek are contributing factors to the temperature impairment. Redwood Creek supports an anadromous fishery, and the estuary is important for juvenile salmonid rearing. Declines in salmonid populations in Redwood Creek have been attributed to the elevated water temperatures. A number of factors contribute to the sedimentation/siltation impairment, including land development, range grazing of riparian habitats, silviculture, logging road construction and maintenance, and the removal of riparian vegetation (MLPAI 2010).

- **Klamath River:** Fourteen impaired bodies of water are associated with the Klamath River Hydrologic Unit, including portions of the Lower and Middle Hydrologic Areas (SWRCB 2010). The Klamath River is the second largest river by volume in California and is listed as a TMDL site primarily for nutrients, organic enrichment, and temperature. The nutrients and organic enrichment impairments are attributed to agricultural, municipal and industrial land uses, and a number of other point and nonpoint sources. The temperature impairment stems from habitat modification, including upstream impoundment and the removal of riparian vegetation, and unspecified nonpoint sources (MLPAI 2010).

Table 3.4-3 shows impaired water bodies that are within or drain into the Study Region. The table includes information on pollutants/stressors and marine protected areas (MPAs) nearby the mouths of the water bodies.

Table 3.4-3. Impaired Water Bodies Discharging to the North Coast Study Region

Name	Pollutant/Stressor	Nearby MPAs
Mattole River	Sedimentation/Siltation	Mattole Canyon SMR (offshore)
Mainstem Eel River (Lower Eel River HA)	Aluminum	N/A[1]
Lower Eel River HA	Dissolved Oxygen, Sedimentation/Siltation, Temperature	N/A[1]
Mainstem Middle Fork Eel River	Aluminum	N/A[1]
Eden Valley HSA and Round Valley HSA	Sedimentation/Siltation, Temperature	N/A[1]
Wilderness HSA and Black Butte River HSA	Temperature	N/A[1]
Mainstem Eel River (Middle Main Eel River HA)	Aluminum	N/A[1]
Middle Main Eel River HA	Sedimentation/Siltation, Temperature	N/A[1]
Lower North Fork Eel River Watershed	Sedimentation/Siltation, Temperature	N/A[1]
Upper North Fork Eel River Watershed	Temperature	N/A[1]
Mainstem South Fork Eel River	Aluminum	N/A[1]
South Fork Eel River HA	Sedimentation/Siltation, Temperature	N/A[1]
Upper Main Eel River HA	Sedimentation/Siltation, Temperature	N/A[1]
Van Duzen River HA	Sedimentation/Siltation	N/A[1]
Elk River	Sedimentation/Siltation	Samoa SMCA, South Humboldt Bay SMRMA
Freshwater Creek	Sedimentation/Siltation	Samoa SMCA, South Humboldt Bay SMRMA
Humboldt Bay	Dioxin Toxic Equivalents, PCBs	Samoa SMCA, South Humboldt Bay SMRMA
Jacoby Creek Watershed	Sediment	Samoa SMCA, South Humboldt Bay SMRMA
Butte Valley HA	Nutrients, Temperature	False Klamath Rock Special Closure
Middle and Lower Klamath HAs	Cyanobacteria, Hepatoxic Microcystins	False Klamath Rock Special Closure
Klamath River from Oregon to the Pacific	Nutrients, Organic Enrichment/Low Dissolved Oxygen, Temperature	False Klamath Rock Special Closure
Tule Lake HSA and Mt. Dome HSA	Nutrients	False Klamath Rock Special Closure

Table 3.4-3. Impaired Water Bodies Discharging to the North Coast Study Region

Name	Pollutant/Stressor	Nearby MPAs
Tule Lake and Lower Klamath Lake National Wildlife Refuge	pH (high)	False Klamath Rock Special Closure
Beaver Creek, Cow Creek, Deer Creek, Hungry Creek and West Fork Beaver Creek	Sediment	False Klamath Rock Special Closure
China Creek, Fort Groff Creek, Grider Creek, Portuguese Creek, Thompson Creek and Walker Creek	Sediment	False Klamath Rock Special Closure
Klamath Glen HSA	Sediment	False Klamath Rock Special Closure
Salmon River HA	Temperature	False Klamath Rock Special Closure
Scott River HA	Sedimentation/Siltation, Temperature	False Klamath Rock Special Closure
Shasta River HA	Organic Enrichment/Low Dissolved Oxygen, Temperature	False Klamath Rock Special Closure
Mad River	Sedimentation/Siltation, Turbidity	Samoa SMCA
Albion River	Sedimentation/Siltation, Temperature	Van Damme SMCA, Navarro River SMCA
Big River	Sedimentation/Siltation, Temperature	Van Damme SMCA, Big River Estuary SMCA, Russian Gulch SMCA
Hare Creek Beach	Indicator Bacteria	MacKerricher SMCA, Point Cabrillo SMR
Navarro River	Sedimentation/Siltation, Temperature	Navarro River Estuary SMCA
Noyo River	Sedimentation/Siltation, Temperature	MacKerricher SMCA, Point Cabrillo SMR, Russian Gulch SMCA, Big River Estuary SMCA
Pudding Creek Beach	Indicator Bacteria	MacKerricher SMCA, Ten Mile Beach SMCA, Point Cabrillo SMR
Ten Mile River	Sedimentation/Siltation, Temperature	Ten Mile SMR, Ten Mile Estuary SMCA, Ten Mile Beach SMCA
Redwood Creek	Sedimentation/Siltation, Temperature	Reading Rock SMCA, Reading Rock SMR (offshore)
Trinidad HU (Clam Beach, Luffenholtz Beach, Moonstone County Park [Beach], Trinidad State Beach)	Indicator Bacteria	Samoa SMCA

Notes: N/A = not applicable, HA = Hydrologic Area, HAS = Hydrologic Subareas, MPA = marine protected area, PCBs = polychlorinated biophenyls, SMCA = state marine conservation area, SMR = state marine reserve, SMRMA = state marine recreational management area

1 No MPAs are within 10 miles of the Eel River along the coast.

2 No MPAs are within 15 miles of the Garcia River along the coast.

Source: SWRCB 2010

Critical Coastal Areas

The California Coastal Commission has designated fourteen areas in and adjacent to the Study Region as critical coastal areas (CCAs) (see **Table 3.4-4**). An overlap exists between the CCAs and impaired water bodies, marine managed areas, wildlife refuges, waterfront parks, beaches, and ASBSs. Although CCAs are nonregulatory, they are intended to encourage the collaboration between state agencies and local authorities (MLPAI 2010).

Table 3.4-4. Critical Coastal Areas in the North Coast Study Region

Critical Coastal Area (CCA) Name	CCA ID Number	County	Nearby Marine Protected Areas
Klamath River	1	Del Norte	False Klamath Rock Special Closure
Redwood Creek	2	Humboldt	Reading Rock SMCA, Reading Rock SMR
Redwood National and State Park	3	Humboldt	Reading Rock SMCA, Reading Rock SMR
Kelp Beds at Trinidad Head	4	Humboldt	Samoa SMCA
Mad River*	5	Humboldt	Samoa SMCA
Eel River*	6	Humboldt	N/A1
Mattole River*	7	Humboldt	Mattole Canyon SMR (offshore)
King Range National Conservation Area	8	Humboldt	Big Flat SMCA, Sea Lion Gulch SMR, Mattole Canyon SMR (offshore)
Pudding Creek	9	Mendocino	MacKerricher SMCA, Ten Mile Beach SMCA, Ten Mile Estuary SMCA, Ten Mile SMR
Noyo River*	10	Mendocino	MacKerricher SMCA, Point Cabrillo SMR, Russian Gulch SMCA, Big River Estuary SMCA
Pygmy Forest Ecological Staircase	11	Mendocino	Russian Gulch SMCA, Point Cabrillo SMR
Big River*	12	Mendocino	Big River Estuary SMCA, Van Damme SMCA, Russian Gulch SMCA
Albion River*	13	Mendocino	Van Damme SMCA, Navarro River SMCA
Navarro River*	14	Mendocino	Navarro River Estuary SMCA

Note: SMCA = state marine conservation area, SMR = state marine reserve
* indicates CCAs not designated as state water quality protection areas.
[1] No MPAS are within 10 miles of the Eel River along the coast.
Source: MLPAI 2010

Coastal Energy Projects

Coastal energy projects may have effects on the Study Region's marine ecology by impacting water quality, oceanographic patterns, habitat suitability, and other environmental conditions (MLPAI 2010). Two types of energy projects are described next.

Electric Generating Plants

Many large coastal power plants (having at least 50 megawatts of generating capacity) use a once-through cooling system that withdraws water from a nearby, open water source such as a bay, estuary, or the ocean. California coastal power plants are permitted to withdraw and discharge approximately 16,700 million gallons of cooling water per day. Generating electricity involves burning fuel in a boiler to turn water into superheated steam. The spent steam is condensed back into water, often using ocean water to absorb the heat. The heated ocean water is then discharged back to the ocean up to 20 degrees warmer than when it was withdrawn. This withdrawal and discharge of cooling water has an impact on ocean organisms and habitats. (MLPAI 2010)

Pacific Gas and Electric Company currently is constructing the Humboldt Bay Generating Station (HBGS) to replace the existing 50-year-old HBPP. The HBGS will utilize a reciprocating engine-generator (air radiator cooling system in a closed loop system, similar

to an automobile cooling system) with a generating capacity of 163 megawatts total output. The newer technology will only use an average of 2,400 gallons of water per day for cooling or other industrial purposes; this is a fraction of the water required for a traditional, combined-cycle turbine design. The new natural gas plant will be 33% more efficient than the existing HBPP fossil fuel units and will eliminate the use of water from Humboldt Bay for once-through cooling (PGE 2011).

Tsunami Risk

Tsunamis, or large sea waves generated by earthquakes, generally affect coastal communities and low elevation river valleys along the coast. Tsunamis in the Study Region have caused significant economic damage and the loss of life. Crescent City is especially at risk from tsunamis because of the ocean floor bathymetry that has the effect of focusing tsunami waves. Most of Arcata Bay is vulnerable to inundation from tsunamis, including portions of the cities of Eureka and Arcata. Tsunami inundation maps for the entire North Coast were developed by the California Geological Survey, in collaboration with the California Emergency Management Agency and the Tsunami Research Center at the University of Southern California (California Geological Survey 2011).

3.4.4 Impact Analysis

Methodology

Potential impacts to water quality were assessed qualitatively, based on the degree to which the Proposed Project could result in violations of water quality standards, impairment of beneficial uses, or water quality conditions that could be harmful to aquatic life or human health.

Criteria for Determining Significance

Based on significance criteria from Appendix G of the State CEQA Guidelines and professional expertise, the Proposed Project would have a significant impact on water quality and hydrologic resources if it would:

A. violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality;

B. substantially deplete groundwater or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level;

C. substantially alter an existing drainage pattern in the Study Region, including through the alteration of the course of a stream or river, in a manner which would result in substantial flooding, erosion, or siltation on- or off-site;

D. create or contribute to runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;

E. place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;

F. place structures within a 100-year flood hazard area that would impede or redirect flood flows;

G. expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam; or

H. expose people or structures to inundation by seiche, tsunami, sea level rise, or mudflow.

For the purposes of this analysis, only impacts relating to the first significance criteria (A) and the last (H) were evaluated because the Proposed Project is intended to protect, maintain, restore, enhance, and manage marine resources, and it would not directly involve land-based changes, including alterations to surface water or groundwater hydrology. Therefore, the remainder of these criteria (B through G) are not applicable and are not evaluated any further.

Environmental Impacts

Impact HYD-1: Effects on Water Quality Standards and Waste Discharge Requirements (Significance Criterion A)

Coastal water quality in the Study Region is generally good because of sparse population, located within a few coastal watersheds, but a number of water quality concerns exist within the Study Region. Coastal water quality within the Study Region is affected by point source discharges, stormwater discharges, nonpoint source pollution, agricultural activities, forestry operations, urban areas, hydrologic modification, ports, harbors, marinas, and associated vessels (as identified in section 3.4.3, "Environmental Setting." In addition, most of the large rivers draining to the Study Region are listed as impaired under CWA Section 303(d). Portions of the Klamath River, Redwood Creek, Mad River, Eel River, Mattole River, Noyo River, Big River, and the Navarro River either require a TMDL or are being addressed by a USEPA-approved TMDL.

Most of the CWA 303(d)-listed rivers draining to the Study Region are near a proposed MPA, as shown in Table 3.4-3. The proposed Navarro River Estuary state marine conservation area (SMCA) and Big River Estuary SMCA overlap the mouths of the Navarro River and Big River, respectively. The proposed Ten Mile State Marine Reserve (SMR), Ten Mile Beach SMCA, and Ten Mile Estuary SMCA either are near, adjacent to, or overlap the mouth of the Ten Mile River. The proposed Samoa SMCA is near the mouth of the Mad River, and the proposed Reading Rock SMCA is near Redwood Creek. Portions of the Navarro River, Big River, Ten Mile River, Mad River, and Redwood Creek are listed as impaired. Water quality impairments in these and other streams draining to the coast may impact water quality within an MPA. However, addressing water quality impairments is the responsibility of the North Coast RWQCB and USEPA; the Proposed Project would not directly affect existing water quality impairments in surface water bodies draining to coastal waters.

The creation of a network of MPAs within the Study Region would not conflict with any aspect of the established water quality standards for the Study Region's coast, bays, lagoons, and estuarine waters. Based on the evaluation of significance criterion A, there would be no significant changes to water quality that would adversely affect aquatic life or human health. Therefore, no violations or impairment of water quality standards or beneficial uses would result from the Proposed Project. Moreover, the protection and enhancement of marine areas is consistent with the goals of the California Ocean Plan and other applicable state plans (as described in section 3.4.2, "Regulatory Setting." The formation of an MPA allows existing, permitted discharges to coastal water to continue, but it does not allow any new discharges to occur within an MPA unless take associated with the activity was specifically authorized by the Commission in a subsequent action. Preventing additional discharges to coastal waters could either maintain water quality in the Study Region or potentially benefit coastal water quality, as natural coastal processes can promote the breakdown of contaminants. Microbes in the marine environment are capable of bioremediation to reduce pollutants to less harmful forms. Enhancing these ecosystems could provide a mechanism to decrease contamination in coastal areas. Therefore, there would be no adverse impact.

Level of Significance: *No Adverse Impact*

Impact HYD-2: Effects of Potential Shifts in Consumptive Uses and Vessel Abandonment on Water Quality (Significance Criterion A)

The establishment of a network of MPAs along the Study Region may result in the displacement of fishing vessels or vessel abandonment. Specifically, as identified in Section 6.5, "Vessel Traffic," the restriction of fishing activity within an MPA could cause fishing vessels and fishing activity to be displaced outside the boundaries of individual MPAs. Areas nearby that are open to fishing could become overcrowded as a result, or vessels may travel further to areas open to fishing (see Appendix B, "Characterization of Consumptive Uses and Associated Socioeconomic Considerations in the Region"). Overcrowding in nearby areas could create a higher potential for concentrated spills of contaminants, particularly petroleum products like grease, oil, or gas, which would negatively affect water quality. Potential impacts from hazardous spills from vessels are discussed in Section 6.5, "Vessel Traffic." Increased fishing in areas near MPAs or increased vessel transit is not anticipated to result in impacts to water quality beyond baseline conditions or to impair beneficial uses of coastal waters.

In response to economic hardship from restricted fishing in MPA areas, vessel abandonment may occur. Abandoned vessels may result in a water quality impact from leaking fuels and oils, solvents, used batteries, or other hazardous content. Vessel abandonment is illegal in California, and the Legislature has passed bills to encourage proper boat disposal, through fines and alternative means of vessel disposal. In 2005, the Legislature passed Assembly Bill (AB) 716, allowing vessels with registrations expired for more than one year to be removed by law enforcement officers and permitting courts to order violators to repay agencies for the costs of removing and disposing of a vessel. AB 166, passed by the Legislature in 2009, offers a free alternative disposal method for boat owners who contact local government agencies. Although it is not possible to predict the individual decisions of vessel owners, free alternative vessel disposal methods are available and penalties for boat abandonment have increased. Therefore, it is reasonable to assume that vessel owners would generally

not abandon their boats in response to the formation of MPAs. This impact would be less than significant.

Level of Significance: *Less than Significant*

Impact HYD-3: Effects of Potential Shifts in Non-Consumptive Recreational Uses on Water Quality (Significance Criterion A)

Changes in nonconsumptive recreational use (e.g., diving, kayaking, wildlife viewing) in the Study Region could affect water quality through accelerated erosion from increased amounts of foot or off-highway vehicle traffic, increased trash, nutrients and bacteria from human and animal waste, and vessel fuel and exhaust spills. As discussed in Section 6.3, "Recreation," the Study Region contains a number of popular locations for nonconsumptive recreational activities, including the Mendocino Headlands State Park, Redwood National Park, lighthouses, underwater parks (such as Van Damme, Russian Gulch, and Point Cabrillo), bays, estuaries, and harbors. Proposed MPAs, including the proposed Van Damme SMCA, Russian Gulch SMCA, and Point Cabrillo SMR, are adjacent to or near many of these popular recreational areas. As discussed in Section 6.3, establishing a network of MPAs would not result in substantial shifts in nonconsumptive recreational uses within the Study Region. Nonconsumptive recreational activities are exempt from the Proposed Project regulations, and users would be able to travel freely within MPAs and along the adjacent coastline, except for Special Closure areas and a few areas that may restrict or prohibit transit and anchoring to protect particularly vulnerable habitat or species (as described in Chapter 2, "Project Description.") Impacts on water quality associated with nonconsumptive recreational uses are, therefore, not expected to change from baseline uses. Existing impacts resulting from recreational activities would continue to be managed by federal and state agencies, and local counties and cities. No impact would occur.

Level of Significance: *No Impact*

Impact HYD-4: Increased Risk of Inundation by Tsunami (Significance Criterion H)

A number of low-lying coastal areas in and adjacent to the Study Region are at risk from inundation by tsunami, as identified on the California Geological Survey's tsunami inundation maps (California Geological Survey 2011). Areas most vulnerable to tsunami impacts include Crescent City and portions of Arcata and Eureka. The proposed network of MPAs are adjacent to mapped areas with a risk of tsunami inundation: the shoreline adjoining MacKerricher SMCA; the Samoa SMCA where it abuts an area at risk from tsunami inundation west of Arcata Bay (the northern portion of Humboldt Bay); and the shoreline adjacent to Reading Rock SMCA.

Constructing coastal structures, such as jetties, piers, and sea walls, could protect against damaging effects of tsunamis, and thus encourage commercial, recreational, or residential development along the coastline. The resulting coastal development would increase the number of people who could be exposed to tsunami effects. Establishing a network of MPAs in the Study Region would prohibit construction of coastal structures within MPA boundaries. Construction of sea walls or other in-water structures to reduce tsunami risk and encourage development along the coastline would conflict with the objectives of the Proposed Project, and the proposed MPAs within mapped tsunami risk areas (Reading Rock, Samoa, and MacKerricher SMCAs) are not adjacent to land identified for future

development. The Proposed Project would not exacerbate tsunami impacts compared to existing conditions. No impact would occur.

Level of Significance: *No Impact*

Impact HYD-5: Increased Risk due to Sea Level Rise and the Proposed Project (Significance Criterion H)

Federal and state policies on greenhouse gas emissions and resulting climate change effects are discussed in Section 3.3 "Greenhouse Gas Emissions." Should sea level rise occur as predicted, the entire coastal area of California would be affected. Implementation of the Proposed Project would not affect sea levels. The Proposed Project would not involve construction of structures that would exacerbate the effects of sea level rise. The Proposed Project would not result in the redirection of people to areas with an increased risk for sea level rise impacts. The Proposed Project would therefore not increase risks to people or the environment due to sea level rise. There would be no impact.

Level of Significance: *No Impact*