SECTION 3
AFFECTED ENVIRONMENT AND IMPACT ANALYSIS

3.1 INTRODUCTION TO AFFECTED ENVIRONMENT AND IMPACT ANALYSIS

3.1.1 Chapter Overview

This chapter provides an overview of the baseline physical, biological, social, and economic conditions that occur within the region of influence (ROI) (the potentially affected area or study area for a particular resource) and is an analysis of the environmental consequences of the Proposed Action (preferred alternative), the Alternative Regulatory Actions, and the No Action alternative. The Proposed Action is the set of regulatory changes for each Sanctuary, as described in Chapter 2. In addition, cumulative impacts are assessed in each resource area.

The chapter is organized by sections on each resource area. As applicable, each section includes a definition of the ROI for that resource, a general overview of relevant legislative and regulatory requirements governing the resource, and a discussion of the general conditions of the resource within the ROI. Because the Proposed Action includes a series of separate regulatory actions that may not equally affect all areas of the three sanctuaries, the affected environment is described in general terms across the three-sanctuary area, with more specific information provided regarding resources affected by specific regulatory changes. As a result, some sections, such as air quality (Section 3.2), provide only a general discussion of the resource conditions, while the biological resources discussion (Section 3.3) provides a more specific discussion of the resources and impacts on each sanctuary.

The second part of each section describes the methodology used for impact analysis and criteria used to determine the significance of direct and indirect impacts (40 CFR 1508.8). Direct impacts are those that are caused by the Proposed Action and occur at the same time and place. Indirect impacts are those that are caused by the Proposed Action but occur later in time or are farther removed in distance from the Proposed Action.

To determine whether an impact is significant, CEQ regulations (40 CFR 1508.27) and NOAA guidance (NAO 216-6) also require the consideration of context and intensity of potential impacts. Context normally refers to the setting, whether local or regional, and intensity refers to the severity of the impact. Also, an EIS should include a discussion of the possible conflicts between the Proposed Action and the objectives of federal, regional, state, and local land use plans and policies for the area concerned (40 CFR 1502.16 [c]).

The impact analysis for each resource category includes a description of how the Proposed Action would change the environment relative to existing conditions and the current management programs. The analysis focuses on issues that could result in potentially significant effects. Impacts are also discussed for those resources that would experience a less than significant or minor impact, but for which one might expect a greater level of impact. Impacts are described for the cross-cutting regulations (regulatory changes that are applicable to all three sanctuaries) first, to limit redundancy, followed by a detailed analysis of the regulatory changes specific for each sanctuary. Potential mitigation for significant adverse impacts is identified where applicable. Related elements of the Proposed Action (such as Discharge Regulation Clarifications and Discharge—Marine Sanitation Devices and Graywater) may be discussed jointly, where separating them out is infeasible or may result in a simple repeat of the discussion. Finally, each section concludes with a discussion of the possible cumulative impacts the project may have on the environment when combined with reasonably foreseeable past, present, and future projects undertaken outside the scope of the proposed regulatory changes.

Impacts are classified according to the following categories:

- Significant unavoidable—Significant and not likely to be mitigated to a level that is not significant;
- Significant mitigable—Significant but could be reduced to a level that is less than significant with identified mitigation;
- Less than significant—Adverse but not significant;
- Beneficial—A positive effect as a result of the Proposed Action; and
- No impact.

Impacts in the top two categories (significant unavoidable or significant mitigable) are assigned an impact number in the text (e.g., *Impact 1: Modification of the existing view*) with a corresponding numbered mitigation. Impacts in the next three categories (less than significant, beneficial or no impact) are not assigned an impact number.

3.1.2 Scope of Impact Analysis

Only the background environmental and socioeconomic conditions relevant to the Proposed Actions are presented, including air quality, biological resources, oceanography and geology, water quality, commercial fisheries, cultural resources, hazardous waste/hazardous materials, land use and development, marine transportation, public access and recreation, research and education, socioeconomics and environmental justice, and visual resources. Resource areas that have been determined to have no potential for significant impacts by the Proposed Action or the Alternative Regulatory Actions are not discussed in this FEIS. See Section 5.5 for a summary of impacts found to be not significant. The analysis of the proposed designation document changes is incorporated in the analysis of related proposed regulatory changes since it is the regulatory changes that could result in changes in the environment and not the change in the designation document.

Within each resource area, the impact analysis addresses only those proposed regulations that have the potential to impact the specific resource. Where there is no potential for a specific proposed regulation to affect a particular resource, the regulation is generally not discussed. The reasoning behind a no impact

finding is discussed only where an impact might reasonably be expected in that context. Beneficial impacts are described when they occur.

Technical Changes

Regulatory changes that are technical and that will result in no direct or indirect impact on any resources in the ROI are not discussed in the impact analysis. These changes include technical administrative changes, minor technical boundary modifications, and other minor technical wording changes that do not change the regulatory intent or compliance requirements, as discussed in Section 2.6.

Analysis of Related Actions

As described in the introduction to Chapter 2, management plan actions that do not result in regulatory changes and have no potential for significant impacts are not considered in this FEIS. These action plans are described in detail in the FMPs in Volumes I, II, and III and summarized in Appendix B. Because the FMPs and non-regulatory action plans will be implemented regardless of whether the Proposed Action or Alternative Regulatory Actions would be approved, the generally beneficial impacts of the FMPs are discussed in the cumulative analysis rather than as part of the direct impact analysis for each resource section.

NOAA Fisheries, in coordination with the PFMC, has promulgated regulations amending the Groundfish Fishery Management Plan along the Pacific coast. These regulations, described in more detail in Sections 3.3.4 and 3.6.2, were finalized on May 11, 2006, and became effective on June 12, 2006 (71 FR 27408). The Proposed Action discussion in this FEIS, therefore, assumes that the regulatory and environmental baseline includes these NOAA Fisheries regulations. In addition, during preparation of this FEIS, the NMSP developed alternatives for CBNMS and Davidson Seamount, as discussed in Sections 2.2.2 and 2.2.4 of the Project Description. These alternatives provide that in the unlikely event that the NOAA Fisheries regulations are not implemented or did not meet the Sanctuary's goals and objectives for each area, bottom-contact fishing would continue to be restricted within the 50-fathom isobath surrounding Cordell Bank, and below 3,000 feet at Davidson Seamount under the NMSA. These alternatives would ensure protection of groundfish and their impacts analyzed under Alternative Regulatory Actions.

3.1.3 Scoping Issues

During the JMPR public scoping process, many issues were raised. The scoping process included solicitation of comments on issues to be addressed in the management plan review, as well as comments on issues to be analyzed in this FEIS. A summary scoping report was prepared, based on over 12,500 comments received during the scoping process for the JMPR, and is provided in Appendix A. The issues raised are listed below in Table 3-1. The majority of scoping issues relate to the management plans rather than to the FEIS, and many of these issues are addressed by non-regulatory action plans in the FMPs. In most cases, proposed regulations analyzed in this FEIS do not affect these identified issues.

Table 3-1
Location of Major Scoping Issue Discussions in Document

Major Scoping Issue	Discussion in Document
Acoustics	Section 3.3 (Biological Resources)
Aquaculture and kelp harvest	Sections 3.3 (Biological Resources), 3.5 (Water Quality), 3.6 (Commercial Fisheries), 3.9 (Land Use and Development)
Boundary modifications	Section 3.3 (Biological Resources)
Coastal armoring impacts on recreational uses	Section 3.11 (Public Access and Recreation)
Coastal development	Section 3.5 (Water Quality), 3.9 (Land Use and Development), 3.14 (Visual Resources)
Coastal erosion and protective armoring	Sections 3.4 (Oceanography and Geology), 3.9 (Land Use and Development)
Conflicts between recreational users and marine wildlife	Sections 3.3 (Biological Resources), 3.11 (Public Access and Recreation)
Cruise ship impacts	Sections 3.5 (Water Quality), 3.10 (Marine Transportation)
Cultural resources	Section 3.7 (Cultural and Maritime Heritage Resources)
Ecosystem-based conservation and management	Sections 3.3 (Biological Resources), 3.6 (Commercial Fisheries)
Education	Sections 3.7 (Cultural and Maritime Heritage Resources), 3.12 (Research and Education)
Enforcement	Sections 3.3 (Biological Resources), 3.7 (Cultural and Maritime Heritage Resources), 3.10 (Marine Transportation)
Exotic species	Sections 3.3 (Biological Resources), 3.5 (Water Quality), 3.6 (Commercial Fisheries), 3.10 (Marine Transportation)
Fishing	Sections 3.3 (Biological Resources), 3.6 (Commercial Fisheries), 3.11 (Public Access and Recreation)
Fishing regulations	Section 3.6 (Commercial Fisheries)
Habitat alteration	Sections 3.3 (Biological Resources), 3.6 (Commercial Fisheries), 3.9 (Land Use and Development)
Impacts from fishing gear	Sections 3.3 (Biological Resources), 3.6 (Commercial Fisheries)
Krill harvesting	Section 3.6 (Commercial Fisheries)
Marine bioprospecting	Sections 3.4 (Oceanography and Geology), 3.9 (Land Use and Development), 3.13 (Socioeconomic, Demographic, and Environmental Justice Resources)
Marine debris and discharge	Sections 3.3 (Biological Resources), 3.4 (Oceanography and Geology), 3.5 (Water Quality), 3.8 (Hazardous Wastes and Waste Disposal), 3.10 (Marine Transportation)
Military activities	Sections 3.3 (Biological Resources), 3.8 (Hazardous Wastes and Waste Disposal), 3.9 (Land Use and Development)
MPWC	Sections 3.5 (Water Quality), 3.11 (Public Access and Recreation), 3.13 (Socioeconomic, Demographic, and Environmental Justice Resources)
Oil and gasoline development	Sections 3.3 (Biological Resources), 3.4 (Oceanography and Geology), 3.5 (Water Quality), 3.8 (Hazardous Wastes and Waste Disposal), 3.9 (Land Use and Development), 3.14 (Visual Resources)
Partnerships between NOAA and community recreational groups	Section 3.11 (Public Access and Recreation)
Radioactive waste	Sections 3.3 (Biological Resources), 3.4 (Oceanography and Geology), 3.5 (Water Quality), 3.8 (Hazardous Wastes and Waste Disposal)
Recreational user conflicts	Section 3.11 (Public Access and Recreation)

Table 3-1
Location of Major Scoping Issue Discussions in Document *(continued)*

Major Scoping Issue	Discussion in Document
Regulations on Recreational Activities	Section 3.11 (Public Access and Recreation)
Research	Section 3.7 (Cultural and Maritime Heritage Resources), 3.12 Research and Education
Socioeconomic impacts on abalone farming, white shark viewing, ecotourism, recreational activities, and other industry sectors that are influential in regional economies	Sections 3.11 (Public Access and Recreation), 3.13 (Socioeconomic, Demographic, and Environmental Justice Resources)
Spill response and contingency planning	Sections 3.3 (Biological Resources), 3.5 (Water Quality), 3.8 (Hazardous Wastes and Waste Disposal)
Surfing restrictions	Section 3.11 (Public Access and Recreation)
Sustainable fisheries	Section 3.6 (Commercial Fisheries)
Tidal scour in Elkhorn Slough	Section 3.4 (Oceanography and Geology)
User conflicts	Sections 3.6 (Commercial Fisheries), 3.9 (Land Use and Development), 3.11 (Public Access and Recreation)
Vessel traffic	Sections 3.3 (Biological Resources), 3.8 (Hazardous Wastes and Waste Disposal), 3.10 (Marine Transportation)
Water quality and Sanctuary beach closures	Sections 3.5 (Water Quality), 3.8 (Hazardous Wastes and Waste Disposal)
Wildlife disturbance	Section 3.3 (Biological Resources), Section 3.11 (Public Access and Recreation)

3.1.4 Cumulative Effects Scenario

CEQ regulations implementing NEPA require that the cumulative impacts of a proposed action be assessed (40 CFR Parts 1500-1508). A cumulative impact is an "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions" (40 CFR 1508.7, NAO 216-6). Cumulative impacts can result from individually minor but collectively significant actions taking place over time (40 CFR 1508.7). NAO 216-6 also requires that cumulative actions, when viewed with other proposed actions that have cumulatively significant impacts, should be discussed in the same impact statement. Per section 5.09(a) of NAO 216-06, impacts of subsequent specific actions by the program will be assessed in subsequent specific NEPA documents.

CEQ's guidance for considering cumulative effects states that NEPA documents "should compare the cumulative effects of multiple actions with appropriate national, regional, state, or community goals to determine whether the total effect is significant" (CEQ 1997). This section presents the methods used to evaluate cumulative impacts, and lists projects that may have cumulative effects when combined with the impacts from the Proposed Action and alternatives discussed in this EIS. At the end of each resource-specific section is a discussion of the cumulative impact on that resource resulting from the contribution of the Proposed Action or alternatives to the impact of the cumulative projects listed in Table 3-2.

Cumulative Impact Assessment Methods

CEQ's cumulative effects guidance sets out several different methods to determine the significance of cumulative effects, such as checklists, modeling, forecasting, and economic impact assessment, where changes in employment, income, and population are assessed (CEQ 1997). This FEIS uses a variety of methods, depending on the resource area, to determine cumulative socioeconomic and environmental effects. Methods

for gathering and assessing data on cumulative impacts include interviews, use of checklists, and trends analysis.

In general, past, present, and future foreseeable projects are assessed by resource area in Chapter 3. Cumulative effects may arise from single or multiple actions and may result in additive or interactive effects. Interactive effects may be either countervailing, where the adverse cumulative effect is less than the sum of the individual effects, or synergistic, where the net adverse cumulative effect is greater than the sum of the individual effects (CEQ 1997). Where applicable, the resource sections include a discussion of whether project impacts will accelerate any ongoing trends of resource degradation. The ROI for cumulative impacts is often larger than the ROI for direct and indirect impacts.

The projects in Table 3-2 are anticipated to occur in the reasonably foreseeable future within the cumulative impact ROI for this project. NOAA has considered the effects of these actions in combination with the impacts of the Proposed Action to determine the overall cumulative impact on the resources discussed in Section 3.

Past, Present, and Reasonably Foreseeable Future Projects

This section identifies numerous projects that could contribute to cumulative impacts (Table 3-2), and provides specific descriptions, where available, for the identified cumulative projects.

The list of cumulative projects was compiled from numerous sources. The initial list of identified projects was reviewed and revised to include only those with some potential to contribute to cumulative impacts. The projects expected to contribute to cumulative impacts are similar in scope to the proposed activities, relate to marine activities, have similar types of impacts within the ROI for a particular resource, affect similar resources within the ROI that are affected by the proposed regulatory changes, or are large enough to have far-reaching effects on a resource. This approach was taken to include both projects for which detailed descriptions and expected impacts are known, as well as projects that have less defined impacts, but, as development projects, may contribute to regional construction-related impacts.

Table 3-2
Projects Expected to Contribute to Cumulative Impacts

Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
Revised Management Plan for CBNMS	Sanctuary and adjacent areas	NOAA	The CBNMS proposed management plan includes five action plans addressing education and outreach, ecosystem protection, partnerships with community groups, conservation science, and administration.	Ongoing
Revised Management Plan for GFNMS	Sanctuary and adjacent areas	NOAA	The GFNMS proposed management plan includes nine action plans addressing water quality, wildlife disturbance, introduced species, ecosystem protection, vessel spills, education, conservation science, resource protection and administration.	Ongoing
Revised Management Plan for MBNMS	Sanctuary and adjacent areas	NOAA	The MBNMS proposed management plan includes twenty-two action plans that will guide the Sanctuary for the next five years. Most of the Action Plans are grouped into four main marine management themes: coastal development, ecosystem protection, water quality, and wildlife disturbance. Two additional sections, partnerships and opportunities, as well as operations and administration, compose Action Plans and strategies that address how the Sanctuary will function and operate.	Ongoing
Amendment 19 to Groundfish Fishery Management Plan	All three sanctuaries	NOAA Fisheries/ PFMC	Proposes to establish fishing gear restrictions and prohibitions; closes areas to bottom trawling (including outer Cordell Bank, Farallon Islands/Fanny Shoal, Half Moon Bay, Monterey Bay/Canyon, Point Sur Deep, Big Sur Coast); and closes areas to all fishing that contacts the bottom (including the area within 50 fathoms of Cordell Bank, and the area below 3,000 feet (914 meters) over Davidson Seamount).	May 2006
General NPDES Permits for Discharges with Low Threat to Water Quality	MBNMS	Regional Water Quality Control Boards (RWQCB)	MBNMS Permit # 2001-047. This permit would apply to many types of waste discharges with very low pollutant content and with no likely adverse effect on water quality, including, among others, brine from small desalination facilities to marine waters and flow-through seawater systems (such as aquariums and aquaculture operations).	Ongoing
Advanced Cabled Observatory in the Monterey Bay Canyon	Monterey Bay	Monterey Bay Aquarium Research Institute	Installation of a 31.7-mile-long (51-km) submerged cable, extending from the shore at Moss Landing in Monterey Bay to the northwest, north of the submarine Monterey Canyon, and along the continental margin to the southeastern part of a shelf slope formation known locally as Smooth Ridge.	Winter—spring 2006 until November 2030
Seawall and Shore Armoring Projects	Shoreline within Sanctuaries	Individuals or Municipalities	Coastal armoring projects may include simple installation of riprap, construction of cribwalls, or large-scale construction to protect erosion-prone areas of the coastline. Permitting Agencies are the five counties with jurisdiction for shorelines in the sanctuaries and the California Coastal Commission.	Various

Table 3-2
Projects Expected to Contribute to Cumulative Impacts *(continued)*

Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
Monterey County General Plan and Local Coastal Plans	Monterey County, adjacent to MBNMS	Monterey County (Approval by Board of Supervisors)	Monterey County is updating its General Plan, which includes elements on land use, recreation, and infrastructure. The General Plan update will also include possible revisions of the local coastal programs in Monterey County, including, the North County, Carmel Area, Del Monte Forest Area, Big Sur Coast, Big Sur River and Little Sur River Plans, which serve as local coastal programs for those areas of Monterey County.	August 2005
San Mateo County General Plan and Local Coastal Plans	San Mateo County, adjacent to MBNMS	San Mateo County (Approval by Board of Supervisors)	San Mateo County is updating its General Plan, which includes elements on land use, recreation, and infrastructure, and the local coastal program.	Ongoing
San Francisco County General Plan and Local Coastal Plans	San Francisco County, near MBNMS	San Francisco County (Approval by Board of Supervisors)	San Francisco County is updating its General Plan, which includes elements on land use, recreation, and infrastructure.	Ongoing
Marin County General Plan and Local Coastal Plans	Marin County, adjacent to GF & MBNMS	Marin County (Approval by Board of Supervisors)	Marin County is updating its General Plan, which includes elements on land use, recreation, and infrastructure.	2007
Bolinas Lagoon Restoration Project	Marin County, GFNMS	Marin County Open Space District, NOAA and US Army Corps of Engineers	Restoration of natural ecological conditions and processes and increasing tidal flow in the Lagoon.	Ongoing; studies under way
Big Lagoon Restoration	Marin County, near GF and MBNMS	National Park Service, Marin County, San Francisco Zen Center	Restoration of ecological conditions and processes, reducing flooding of local infrastructure, and providing public access to the beach and restored wetland and creek. The National Park Service is undertaking a comprehensive conservation planning and environmental impact analysis regarding the proposed restoration/enhancement of the lower Redwood Creek watershed at Muir Beach. The purposes of the project are to restore or enhance ecological conditions and processes, reduce flooding of local infrastructure, and provide public access to the beach and restored wetland and creek.	Ongoing; studies under way

Table 3-2
Projects Expected to Contribute to Cumulative Impacts *(continued)*

Project	Related Project Location	Project Sponsor	Project Description	Projected Completion Date
Pleasure Point Study	Nearshore Areas of the Pleasure Point area of Santa Cruz County within MBNMS	US Geologic Survey	Installation, maintenance, and recovery of temporary oceanographic research equipment mounted in a patch of sand in the surf zone to conduct geology and oceanographic studies.	October 2005—September 2007
Planktonic Studies project	Within Monterey Bay.	Partnership for Interdisciplinary Studies of Coastal Oceans	To deploy bottom-mounted instrumentation for planktonic studies.	September 2005—May 2007
Santa Cruz Harbor Dredging and Disposal	Santa Cruz Harbor, and disposal offshore of Twin Lakes State Beach, adjacent to MBNMS	Port of Santa Cruz	Yearly dredging is undertaken by the Santa Cruz Port District, co-funded by USACE, and can remove up to 350,000 cubic yards of spoils. The dredge disposal authorization is up for renewal by MBNMS.	Ongoing
Moss Landing Harbor Dredge and Disposal	Moss Landing Harbor, adjacent to MBNMS		Yearly dredging removes 50,000-150,000 cubic yards of spoils from the harbor.	Ongoing
Bodega Bay Dredging	Bodega Bay Harbor, adjacent to GFNMS	US Army Corps of Engineers, Sonoma County Parks Department	USACE dredged the federal channel in order to maintain safe navigation.	2005

3.2 AIR QUALITY AND CLIMATE

This section addresses air quality issues related to the proposed actions. The climate, meteorology, and existing air quality of the region are described, and a summary of federal, state, and local guidelines pertaining to air quality is provided. The impact analysis presents the standards used to evaluate impacts on air quality and addresses potential effects of the proposed actions on air quality. The ROI for the air quality analysis varies according to the type of air pollutant being discussed; some pollutants, such as carbon monoxide, have a localized area of effect, while other pollutants, such as ozone, have a regional area of effect.

3.2.1 Regulatory Overview

The US Environmental Protection Agency (USEPA) has established national ambient air quality standards (NAAQS) for ozone, nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), 10-micron particulate matter (PM_{10}), 2.5-micron particulate matter ($PM_{2.5}$), and airborne lead. Areas with air pollution levels above these standards are considered "nonattainment areas" and are subject to planning and pollution control requirements that are more stringent than normal requirements. Attainment status for each air basin in the ROI is discussed below in Section 3.2.2.

In addition, the California Air Resources Board (CARB) has established standards for ozone, CO, NO_2, SO_2, sulfates, PM_{10}, airborne lead, hydrogen sulfide, and vinyl chloride at levels designed to protect the most sensitive members of the population, particularly children, the elderly, and people who suffer from lung or heart diseases.

Both state and national air quality standards consist of two parts—an allowable concentration of a pollutant, and an averaging time over which the concentration is to be measured. Allowable concentrations are based on the results of studies of the effects of the pollutants on human health, crops and vegetation, and, in some cases, damage to paint and other materials. The averaging times are based on whether the damage caused by the pollutant is more likely to occur during exposures to a high concentration for a short time (one hour, for instance) or to a relatively lower average concentration over a longer period (eight hours, 24 hours, or one month). For some pollutants there is more than one air quality standard, reflecting both its short-term and long-term effects. Table 3-3 presents the state and national ambient air quality standards for selected pollutants. The California ambient air quality standards are generally set at concentrations that are lower than the federal standards and in some cases have shorter averaging periods.

Section 176(c) of the Federal Clean Air Act (FCAA) (CARB 2004) contains provisions that apply specifically to federal agency actions, including actions that receive federal funding. This section of the FCAA requires federal agencies to ensure that their actions are consistent with the FCAA and with applicable state air quality management plans.

The USEPA's general conformity rule applies to federal actions occurring in nonattainment or in certain designated maintenance areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds. The emission thresholds that trigger requirements of the conformity rule are called de minimis levels. Emissions associated with stationary sources that are subject to permit programs are incorporated into the state implementation plan and are not counted against the de minimis threshold. Applicable threshold levels for federal actions in the San Francisco Air Basin (SFAB), the North Central Coast Air Basin (NCCAB), and the South Central Coast Air Basin (SCCAB) are 91 metric tons

Table 3-3
Federal and State Ambient Air Quality Standards

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		Federal Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	0.12 ppm (235 µg/m³) [8]	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	—		0.08 ppm (157 µg/m³) [8]		
Respirable Particulate Matter (PM10)	24 Hour	50 µg/m³	Gravimetric or Beta Attenuation [9]	150 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m³ [9]		50 µg/m³		
Fine Particulate Matter (PM2.5)	24 Hour	No Separate State Standard		65 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m³ [9]	Gravimetric or Beta Attenuation [9]	15 µg/m³		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10mg/m³)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m³)	None	Non-Dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m³)		35 ppm (40 mg/m³)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m³)		—	—	—
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	—	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m³)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.25 ppm (470 µg/m³)				
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	—	Ultraviolet Fluorescence	0.030 ppm (80 µg/m³)	—	Spectrophotometry (Pararosaniline Method)
	24 Hour	0.04 ppm (105 µg/m³)		0.14 ppm (365 µg/m³)	—	
	3 Hour	—		—	0.5 ppm (1300 µg/m³)	
	1 Hour	0.25 ppm (655 µg/m³)		—	—	—
Lead [10]	30 Day Average	1.5 µg/m³	Atomic Absorption	—	—	—
	Calendar Quarter	—		1.5 µg/m³	Same as Primary Standard	High Volume Sampler and Atomic Absorption
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		No Federal Standards		
Sulfates	24 Hour	25 µg/m³	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride [10]	24 Hour	0.01 ppm (26 µg/m³)	Gas Chromatography			

* On June 20, 2002, the Air Resources Board approved staff's recommendation to revise the PM10 annual average standard to 20 µg/m³ and to establish an annual average standard for PM2.5 of 12 µg/m³. These standards will take effect upon final approval by the Office of Administrative Law, which is expected in February 2003. Information regarding these revisions can be found at http://www.arb.ca.gov/research/aaqs/std-rs/std-rs.htm

Source: California Air Resources Board 2003b

Notes:

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM10, 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 eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when 99 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.

3. Concentration 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 which can be shown to the satisfaction of the ARB 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. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

8. New federal 8-hour ozone and fine particulate matter standards were promulgated by U.S. EPA on July 18, 1997. Contact U.S. EPA for further clarification and current federal policies.

9. The ARB 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.

(100 tons) per year of ozone precursors (volatile organic compounds and nitrogen oxides) and 91 metric tons per year of PM_{10}. The federal agency providing the funding for the proposed action is responsible for submitting conformity determination documentation to the USEPA. As described in Section 3.2.8, the Proposed Action would not result in emissions that exceed the thresholds; therefore, the Proposed Action is not subject to a formal conformity determination.

3.2.2 Regional Overview of Affected Environment

The main sources of air pollution from within the sanctuaries come from diesel exhaust from ship engines, and from incineration of garbage on vessels within the sanctuaries. The State Water Resources Control Board estimates that cruise ships in California emit over 12 tons of pollutants per day (SWRCB 2003). Vessel traffic within the sanctuaries contributes to the degradation of air quality. Diesel exhaust has a high sulfur content, producing sulfur dioxide, nitrogen dioxide, and particulate matter in addition to common products of combustion such as carbon monoxide, carbon dioxide, and hydrocarbons.

CBNMS and GFNMS are located within the SFAB, and MBNMS is located within the NCCAB and the SCCAB in San Luis Obispo County. The following section describes the existing climate and attainment status of the San Francisco, North Central Coast, and South Central Coast air basins. The attainment status for the three air basins is summarized in Table 3-4.

San Francisco Air Basin

Climate

The SFAB includes the counties of Alameda, Contra Costa, Marin, Napa, San Francisco, Santa Clara, San Mateo, plus portions of Solano and Sonoma Counties. The San Francisco Bay Area climate is characterized by moderately wet winters and dry summers. The summer climate of the West Coast is dominated by a semipermanent high centered over the northeastern Pacific Ocean. Because this high pressure cell is quite persistent, storms rarely affect the California coast during the summer. Thus the conditions that persist along the coast of California during summer are a northwest air flow and negligible precipitation. A thermal low pressure area from the Sonoran-Mojave Desert also causes air to flow onshore over the San Francisco Bay Area much of the summer.

The steady northwesterly flow around the eastern edge of the Pacific high pressure cell exerts a stress on the ocean surface along the west coast. This induces upwelling of cold water from below. Upwelling produces a band of cold water that is approximately 130 km (80 miles) wide off San Francisco. During July the surface waters off San Francisco are 17°C (30°F) cooler than those off Vancouver, more than 1,000 km (700 miles) farther north.

Air approaching the California coast, already cool and moisture-laden from its long trajectory over the Pacific, is further cooled as it flows across this cold bank of water near the coast, thus accentuating the temperature contrast across the coastline. This cooling is often sufficient to produce condensation – a high incidence of fog and stratus clouds along the Northern California coast in summer.

Table 3-4
Air Quality Attainment Status for Air Basins within the Sanctuaries

Criteria Air Pollutant	San Francisco Air Basin[1]	North Central Coast Air Basin[2]	South Central Coast Air Basin[3]
Ozone – Federal 1-hour	Non-Attainment	Maintenance Area	Unclassified/Attainment Ventura County-Nonattainment
Ozone – Federal 8-hour	Marginal nonattainment	Unclassified/Attainment	Unclassified/Attainment Ventura County-Nonattainment
State Ozone	Nonattainment	Moderate nonattainment	San Luis Obispo County - Attainment Santa Barbara and Ventura Counties - Nonattainment
Federal PM10	Unclassified	Attainment/ Unclassifiable	Attainment/ Unclassifiable
State PM10	Nonattainment	Nonattainment	Nonattainment
State PM2.5	Nonattainment	Attainment[3]	Unclassified Ventura County-Nonattainment[3]
Federal PM2.5	Attainment/ Unclassifiable	Attainment/ Unclassifiable	Attainment/ Unclassifiable
Federal CO and NOx	Unclassified/ Attainment	Attainment/ Unclassifiable	Attainment/ Unclassifiable
State CO	Attainment[3]	Unclassified/ Attainment[3]	Attainment[3]
State NOx	Attainment	Attainment	Attainment
Federal SOx	Attainment	Unclassified	Unclassified Ventura County-Attainment
State H2S	Unclassified	Unclassified	Attainment Ventura County-Unclassified
State Sulfates	Attainment	Attainment	Attainment
State Pb	Attainment	Attainment	Attainment
State Visibility Reducing Particles	Attainment	Unclassified	Unclassified

Sources:

1. BAAQMD 2004b
2. City of Santa Cruz 2004.
3. CARB 2005.

During the winter season, the Pacific High weakens and shifts southward, upwelling ceases, and winter storms become frequent. Almost all of the Bay Area's annual precipitation takes place in the November through April period. Winter rains (December through March) account for about 75 percent of the average annual rainfall; about 90 percent of the annual total rainfall is received in the November-April period; and between June 15 and September 22, normal rainfall is typically less than 1/10 inch. During the winter rainy periods, inversions are weak or nonexistent, winds are often moderate, and air pollution potential is very low. However, there are frequent winter dry periods lasting over a week. It is during some of these periods that CO and particulate pollution episodes develop (BAAQMD 2004a).

Attainment Status

The SFAB is managed by the Bay Area Air Quality Management District (BAAQMD). Under the FCAA, the SFAB is designated as a nonattainment-unclassified area for the federal one-hour ozone NAAQS and a marginal nonattainment area for the federal eight-hour ozone NAAQS. Under the California Clean Air Act (CCAA), the basin is a nonattainment area for the state ozone AAQS. Further, the basin is designated a nonattainment basin for the state PM_{10} and $PM_{2.5}$ AAQS. The basin is classified as attainment or unclassified for the rest of the state and federal pollutant standards (BAAQMD 2004b). All attainment status designations are shown in Table 3-4.

North Central Coast Air Basin

Climate

The NCCAB, which is just south of the San Francisco Bay Area Air Basin, covers an area of 13,362 square km (5,159 square miles) and contains the counties of Santa Cruz, San Benito, and Monterey. The NCCAB has a similar climate to the SFAB, in that it is characterized by moderately wet winters and dry summers with fog and low coastal clouds. Marine breezes from off the Pacific Ocean dominate the climate of the NCCAB. Westerly winds predominate in all seasons but are strongest and most persistent during the spring and summer months. The extent and severity of the air pollution problem in the NCCAB is a function of the area's natural physical characteristics (weather and topography), as well as human-created influences (development patterns and lifestyle). Factors such as wind, sunlight, temperature, humidity, rainfall, and topography all affect the accumulation and/or dispersion of pollutants throughout the NCCAB area (City of Santa Cruz 2004).

In general, the air pollution potential of the coastal areas is relatively low due to persistent winds. The NCCAB is, however, subject to temperature inversions that restrict vertical mixing of pollutants, and the warmer inland valleys of the NCCAB have a high pollution potential.

Attainment Status

The NCCAB is managed by the Monterey Bay Unified Air Pollution Control District (MBUAPCD). Under the FCAA, the NCCAB is designated a maintenance area for the federal one-hour ozone AAQS. The NCCAB was redesignated from a moderate nonattainment area to a maintenance area in 1997 after meeting the federal one-hour ozone standard in 1990. The NCCAB is designated as an attainment area for the federal eight-hour ozone NAAQS. Under the CCAA, the NCCAB is a moderate nonattainment area for the state ozone AAQS. Further, the NCCAB is designated a nonattainment basin for the state PM_{10} AAQS (City of Santa Cruz 2004). The NCCAB is classified as attainment or unclassified for the rest of the state and federal pollutant standards. All attainment status designations are shown in Table 3-4.

South Central Coast Air Basin

Climate

The southernmost section of MBNMS abuts San Luis Obispo County and the SCCAB, which encompasses San Luis Obispo, Santa Barbara, and Ventura Counties. The northern portion of this air basin is separated by mountains from the more polluted southern areas, which are adjacent to the South Coast Air Basin. The air quality in the northern portion of the basin is more linked to conditions in San Francisco Bay and San Joaquin Valley than to the South Coast Air Basin. The San Luis Obispo area has a Mediterranean climate, with about 315 days of sunshine on average each year. Spring and fall brings daytime temperatures in the 70s and cool nights. Summer days are warm and sunny with foggy mornings.

Attainment Status

The SCCAB is managed by the San Luis Obispo County Air Pollution Control District (SLOAPCD). SCCAB is designated as unclassified/ attainment for both the Federal 1-hour and 8 hour ozone standard except for Ventura County, which is designated nonattainment. SCCAB is designated unclassifiable for the federal PM_{10} standard and unclassifiable/attainment for the other federal criteria pollutant standards (CARB 2005). The SCCAB is designated nonattainment for the state PM_{10} standard and unclassified for state PM 2.5 standards except for Ventura County, which is designated as a nonattainment area. The SCCAB is designated attainment for state ozone in San Luis Obispo County and nonattainment for state ozone in Santa Barbara and Ventura Counties. The SCCAB is designated unclassifiable or attainment for the other state criteria pollutant standards. All attainment status designations are shown in Table 3-4.

3.2.3 Significance Criteria and Impact Methodology

Criteria to determine the significance of air quality impacts are based on federal, state, and local air pollution standards and regulations. Impacts are considered to be significant if project emissions would result in the following:

- Increase ambient pollutant levels from an attainment or nonattainment-transition status to nonattainment under the NAAQS or California Ambient Air Quality Standards;
- Exceed the thresholds the regional air agencies use for determination of significance for California Environmental Quality Act (CEQA) purposes (thresholds are based on the amount of emissions projected to be generated by a project and are expressed in terms of either pounds per day or tons per quarter); or
- Otherwise violate the NMS or NOAA Program Regulations.

For the purposes of this analysis, major factors considered in determining whether a project alternative would have a significant impact on air quality include the following:

- The amount of net increase in emissions per year of criteria pollutants within a given air basin or offshore sanctuary (the Clean Air Act sets a threshold of 91 metric tons [100 tons] per year for nonattainment areas);
- Whether relatively high emissions would occur on a continuing basis for periods longer than the timeframe of relevant ambient air quality standards (e.g., 8-hour periods for ozone precursors; 3-hour and 24-hour periods for sulfur oxides; 24-hour periods for PM_{10});

- Whether emissions of precursors to ozone or other secondary pollutants would occur in such quantities and at such locations as to have a reasonable potential to cause or contribute to a violation of federal or state ambient air quality standards; or
- Whether emissions of hazardous air pollutants could exceed state standards or other hazardous air pollutant exposure guidelines at locations accessible to the general public.

The overall methodology, including data sources and assumptions, used to conduct the air quality and climate impact evaluation is consistent with the NOAA NEPA guidelines (NAO 216-6). Pursuant to the above criteria, no adverse air quality impacts were identified for the proposed actions, as implementation of the proposed actions would serve to reduce air emissions rather than increase emissions. Therefore, regional and state thresholds regarding air emission quantities are not discussed further since the proposed and alternative regulatory changes will not result in increases in daily, monthly, or annual emission volumes.

3.2.4 Cross-Cutting Regulations –Environmental Consequences

The cross-cutting regulations identified in Table 2-1 include identical or very similar changes to the regulations in all of the three sanctuaries. The impacts resulting from these changes are discussed as a group to reduce redundancy in this EIS.

The Proposed Action

Introduced Species

Implementing stricter regulations to reduce the number of introduced species into the sanctuaries would have no impact on air quality.

Vessel Discharge Regulations and Clarifications

Amending the language within discharge regulations is expected to have a negligible but beneficial impact on air quality within the Sanctuaries. Large vessels (300 GRT or greater) would no longer be allowed to discharge sewage and graywater effluents if they have sufficient holding tank capacity to hold their waste while in the Sanctuary. Clarifying other discharge regulations could affect how current activities within the sanctuary are conducted and could reduce the amount of discharges from marine vessels, including discharges of liquid or solid pollutants that in-turn can generate air pollutant emissions. If there is a significant reduction in oily wastes from bilges, ballast water or wastes from meals on board vessels, and raw sewage from MSDs, the amount of petrochemicals and other chemicals and compounds that could vaporize and become airborne may be reduced. This could indirectly improve air quality within the sanctuaries by reducing the amount of air pollutants that occur in the ROI. However, the degree to which this beneficial effect may occur is not known.

Cruise Ship Discharge

The proposed regulations on cruise ships within the three sanctuaries are expected to provide a negligible but beneficial impact on air quality within the sanctuaries. Though the regulation does not address air pollution and engine exhaust directly, stricter regulations that prohibit cruise ships from discharging liquid and solid wastes into the sanctuaries are expected to reduce the overall amount of sewage, graywater, blackwater, and other oily and hazardous wastes into the Sanctuary, which could become airborne. Reducing the overall amount of discharged wastes would reduce the possibility that these wastes could vaporize and degrade the overall air quality. Therefore, this regulation would have slight, though unknown, beneficial impacts to air quality.

Alternative Regulatory Actions

The only alternative regulatory action under this section is for cruise ship discharge, which would allow cruise ships to discharge in the sanctuary as long as they are within US Coast Guard standards for Alaska. Since the alternative would presumably allow the discharge of some chemicals, compounds or oily wastes, the impacts of this Alternative Regulatory Actions would be slightly less beneficial than the Proposed Action.

The No Action Alternative

The No Action alternative would continue to manage the sanctuaries as they are currently managed. The No Action alternative would maintain the status quo and would not provide the sanctuaries with enhanced air quality protections described for the proposed action.

3.2.5 Cordell Bank National Marine Sanctuary –Environmental Consequences

The Proposed Action

The several proposed regulatory changes for CBNMS may result in a slightly beneficial net effect on air quality, when considered collectively for future conditions. Individually, the effects are negligible, as described below.

Seabed Protection

Stricter regulations prohibiting construction, drilling, and dredging within the Sanctuary would have the potential to slightly reduce the amount of future marine traffic in that specific area within the sanctuary boundaries. The proposed regulation would have the potential to avoid future air emissions that could otherwise occur under the existing regulations, as it would prohibit future activities that could cause air emissions as a by-product of construction, drilling, dredging, and other prohibited activities. However, there are no current or proposed uses involving construction, drilling, or dredging activities, so there would be no change to the current marine vessel traffic. Therefore, this proposed prohibition would not result in a change in existing air emissions or air quality associated with those activities.

Benthic Habitat Protection

The proposed regulatory change only slightly modifies the existing regulation relating to removing, taking or injuring or attempting to remove, take or injure benthic invertebrates on or within the line representing the 50-fathom isobath surrounding Cordell Bank. These minor changes are not anticipated to result in changes to existing air emissions or air quality associated with those activities. The impact of this provision on air quality would be the same as under the Seabed Protection provision, above.

Wildlife Disturbance

Adopting the proposed prohibition regarding the taking or possessing of protected wildlife within the sanctuaries duplicates existing regulations established in the MMPA, ESA, and MBTA. Since sanctuary users are already required to comply with these regulations, current activities in the sanctuary would not change. The proposed action would not affect the amount of marine traffic within the sanctuary boundaries. If the enforcement provisions associated with the proposed prohibition acted as a substantial deterrent to current illegal practices (although there is no documentation of the level of illegal activities that may be taking place), there may be a very slight reduction in marine vessel activity and associated air emissions. Therefore, this proposed prohibition would not result in a change to existing air emissions or air quality associated with those activities and would have a negligible impact on air quality.

Alternative Regulatory Actions

The net impact on human use is the same for the preferred alternative and the alternative regulatory actions. The alternatives would have the same negligible beneficial impacts on air quality as identified in the Proposed Action.

Seabed Protection Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within the line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action, that met the Sanctuary's goals and objectives for protecting the benthic habitats in this area. This alternative, in addition to the prohibitions discussed above under the Proposed Action, would prohibit bottom contact fishing gear within the 50-fathom isobath around the Bank. Because the outcome of the alternative would be the same as under the Proposed Action, there would be no change in existing air emissions or air quality associated with those activities, and no impact on air quality from this provision.

Benthic Habitat Protection Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within a line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action. This alternative, in addition to the prohibitions discussed above under the Proposed Action, would prohibit bottom contact fishing gear on or within the line representing the 50-fathom isobath surrounding Cordell Bank. Because the outcome of the alternative would be the same as under the Proposed Action, there would be no change in existing air emissions or air quality associated with those activities, and no impact on air quality from this provision.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed; this would result in no change to impacts on air quality in the ROI.

3.2.6 Gulf of the Farallones National Marine Sanctuary – Environmental Consequences

The Proposed Action

Deserted Vessels

Prohibiting marine vessel owners from deserting vessels adrift, at anchor, or aground could indirectly have a slight beneficial impact on local air quality. When a vessel is deserted, there is a risk of it grounding on the shoreline, breaking apart, and discharging harmful matter (e.g., motor oil) into the marine environment, which could include emissions into the air basin. With the new prohibition, the likelihood of these occurrences would be reduced. The proposed action also includes a provision that would prohibit leaving harmful matter aboard a grounded or adrift and unattended vessel. This prohibition could provide further air quality benefits by reducing the potential for discharge of oil and fuel and associated pollutant emissions, which can negatively impact air quality. This proposed prohibition would result in a decrease in the amount of spilled substances, including those that could become airborne such as oily and hazardous wastes, which would have a slightly beneficial impact on local air quality.

Oil and Gas Pipeline Clarification

The proposed minor change to the existing regulation regarding the placement of oil and gas pipelines in GFNMS would have a negligible effect on air quality. Since pipelines would be permitted only for oil and gas operations that are adjacent to the Sanctuary, rather than oil and gas operations anywhere outside of the Sanctuary, the potential for future pipeline development would be more limited. However, there are no current oil and gas operations in the area and none planned in the near future. Therefore, there this regulation would have a negligible effect on air quality.

Wildlife Disturbance

Adopting the proposed prohibition regarding the taking or possessing of protected wildlife within the sanctuaries duplicates existing regulations established in the MMPA, ESA, and MBTA. Since sanctuary users are already required to comply with these regulations, current activities in the sanctuary would not change. The Sanctuary is also proposing to regulate the attracting and approaching within 50 meters of a white shark. The proposed actions are not likely to result in significant decreases in the amount of marine traffic within the sanctuary boundaries. If the enforcement provisions associated with the proposed prohibition acted as a substantial deterrent to current illegal practices (although there is no documentation of the level of illegal activities that may be taking place), there may be a very slight reduction in marine vessel activity and associated air emissions. Therefore, this proposed prohibition would not result in a change to existing air emissions or air quality associated with those activities and would have a negligible beneficial impacts on air quality.

Alternative Regulatory Actions

The alternative regulatory action is to prohibit attracting or approaching white sharks anywhere in the sanctuary. This provision may result in a slight reduction of vessel traffic in the Sanctuary from those few operators who only seek out encounters white sharks; however, this amount of traffic is negligible in comparison with all the other shipping and other vessels using the Sanctuary. Therefore, the alternative would have negligible beneficial impacts on air quality.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no change in impacts on air quality.

3.2.7 Monterey Bay National Marine Sanctuary–Environmental Consequences

The Proposed Action

Deserted Vessels

This proposed two-part regulation is the same as described for GFNMS. Therefore, air quality benefits from this proposed regulation in MBNMS would be the same as described in Section 3.2.6, Deserted Vessels, for GFNMS. This proposed prohibition would result in a decrease in the amount of spilled substances, including those that could become airborne such as oily and hazardous wastes, which would have a slightly beneficial impact on local air quality.

Boundary Changes/Davidson Seamount

Adding the Davidson Seamount to the boundary of MBNMS would have minimal yet beneficial impacts on air quality. The proposed regulation would protect Davidson Seamount from future disturbance or from

resource exploitation. The standard MBNMS discharge regulations and seabed disturbance regulations relating to drilling, dredging, seabed alterations, construction, and anchoring would apply to the DSMZ (with certain exceptions). At depths greater than 3,000 feet (914 meters) below the sea surface, the NMSP would prohibit moving, removing, taking, collecting, harvesting, disturbing, breaking, cutting, or other wise injuring Sanctuary resources (or attempting to do those activities), except for fishing, which is prohibited pursuant to the MSA (50 CFR part 660). The Sanctuary would also prohibit the possession of Sanctuary resources taken from below 3,000 feet within the DSMZ, except for the possession of fish resulting from fishing, which is prohibited pursuant to the MSA. The NMSP would rely upon the NOAA Fisheries regulatory amendments to the Groundfish FMP to regulate any fishing-related impacts below 3000 feet. Applying the various sanctuary discharge regulations to the seamount area could result in reduced discharges and associated pollutant emissions from vessels transiting the area, such as cruise ships. However, other existing discharge regulations already apply to non-sanctuary waters, so the potential benefit, if any, is very minor.

Motorized Personal Watercraft

Amending the language that defines MPWC within the sanctuary could result in a beneficial impact on air quality since it would limit the type of MPWC that can be used legally in the Sanctuary. If some of these users, who normally operate outside of the existing zones, do not want to restrict their MPWC use to the existing four zones and new seasonal zone, they may choose not to operate in the Sanctuary. This would reduce the number of MPWC operating in the Sanctuary and thus reduce the amount of exhaust, and fuel leaking into the Sanctuary. Currently 12 million marine engines are operated in the US (including MPWC). These marine engines are among the highest contributors of hydrocarbons (HC) and nitrogen oxides (NOx) emissions in many areas of the country (USEPA 1996). Based upon reports from harbormasters and NOAA enforcement personnel, MBNMS estimates that 1,200 MPWC trips were conducted in the Sanctuary in 2002, which represents repeated activity of approximately 150 individual MPWC. Clearly defining which types of MPWC are allowed to be used in designated areas within MBNMS may result in a slight reduction in the number of MPWC operating in the Sanctuary, which in turn would reduce the amount of pollutants emitted from these vessels. Therefore, this regulation would have slight beneficial impacts on local air quality.

Dredge Disposal

Redefining and officially locating disposal site SF-12 would ensure that dredged material is deposited into the deeper Monterey Canyon and not at shallower nearshore areas where wash-ups could occur and result in odors due to hydrogen sulfide and other compounds. Odors have been a concern along the shoreline where dredged materials have washed up in the surf zone. This proposed action would eliminate the dredge material from washing on shore and subsequently becoming airborne, and thus would have a beneficial impact on air quality.

Alternative Regulatory Actions

The alternatives would have the same impacts on air quality as identified in the Proposed Action, with the following minor differences:

Davidson Seamount Circular Boundary Alternative

The circular configuration of the David Seamount addition to MBNMS would have similar but slightly greater beneficial impacts on air quality as identified in the Proposed Action. Applying the various sanctuary discharge regulations to the seamount area could result in reduced discharges and associated pollutant emissions from vessels transiting the area, such as cruise ships. However, other existing discharge regulations already apply to non-sanctuary waters, so the potential benefit, if any, is very minor. This circular boundary

alternative would add 707 square miles to the Sanctuary, versus 585 square miles for the preferred option. As such it would have slightly greater benefits to air quality.

Motorized Personal Watercraft Alternative

This alternative would essentially ban all MPWC from the sanctuary. With this comprehensive prohibition, including elimination of the four zones where MPWC are currently allowed, this alternative would result in a greater beneficial impact on air quality than the Proposed Action by reducing all MPWC air and water emissions in the Sanctuary. It would also reduce the overall marine vessel air pollutant emissions throughout the sanctuary. Therefore, this regulation would have beneficial impacts on air quality.

The No Action Alternative

The No Action alternative would be to continue to manage the sanctuary as it is currently managed. This would result in no change in impacts on air quality.

3.2.8 Clean Air Act de Minimis Level Impact Evaluation

The proposed sanctuary regulations would result in negligible, if any, increases in emissions. In fact, as described in the above impact analysis, most of the proposed and alternative regulations would have the potential to reduce emission levels in the sanctuaries. Because of these low emissions levels, the proposed action is not subject to the FCAA conformity determination rule (described in Section 3.2.1), and a draft Record of Non-applicability is provided in the Administrative File.

3.2.9 Cumulative Impacts

Due to the high mobility of air pollution, the ROI for cumulative impacts on air quality is larger than for other resources. The ROI for cumulative projects includes the three air basins that encompass the three sanctuaries: SFAB, the NCAAB, and the northern portion of the SCCAB.

A trends analysis was done by CARB in 2004 for the overall state and the five most populated air basins in California. The SFAB, NCCAB, and SCCAB would have similar trends due to their proximity to each other, therefore only the trends for SFAB are discussed in detail. The emission levels for the ozone precursors NOx and Reactive Organic Gases (ROG) have been trending downward in the SFAB since 1975 and 1980, respectively. CO emissions have also been trending downward since 1975. On-road motor vehicles are the largest contributors to CO, ROG, and NOx emissions in the air basin. Implementing stricter mobile source (both on-road and other) emission standards will continue to decrease vehicle emissions in this air basin. Controls on stationary source solvent evaporation and fugitive emissions will also continue to reduce ROG emissions. Direct emissions of $PM_{2.5}$ have declined slightly from 1975 to the present date in the SFAB and are expected to decline up to the year 2010. However direct emissions of PM_{10} have increased in the SFAB between 1975 and the present date and are expected to continue to increase up to the year 2010. This increase is due to growth in emissions from area-wide sources, primarily fugitive dust sources (CARB 2004).

Implementation of the FMPs will contribute to the ROI's regional ecosystem health, including air quality, by applying the various action plans in CBNMS, GFNMS, and MBNMS. Implementation of cross-cutting ecosystem management and similar Sanctuary-specific action plans will provide the Sanctuaries with more complete information regarding air quality within their boundaries. Non-regulatory action plans that address vessels spills, water quality, and MPWCs in particular, may have generally minor beneficial impacts on air quality.

The Proposed Action

The proposed regulations, individually or collectively, would not contribute to the cumulative adverse trend in PM_{10} emissions noted above; therefore, there would be no cumulative adverse impacts. Impacts on air resources from the Proposed Action are expected to be positive, and emission levels for other pollutants are trending downward; this would result in a contribution to a cumulative beneficial impact.

Alternative Regulatory Actions

Cumulative impacts would be the same as those described under the Proposed Action, with a slight increase in the level of beneficial impacts due to the increased levels of protection afforded by alternatives, such as the MPWC Alternative.

The No Action Alternative

The No Action alternative would maintain the status quo of sanctuary management. As described above, only cumulative PM_{10} emissions are expected to increase in the ROI in the near future; other criteria pollutant emissions (CO, ROG and NOx) are expected to decrease in the future. Continued sanctuary management activities would not contribute to substantive increases in PM_{10} emissions or result in reductions in emissions; therefore the No Action alternative would have no adverse cumulative effects on air quality.

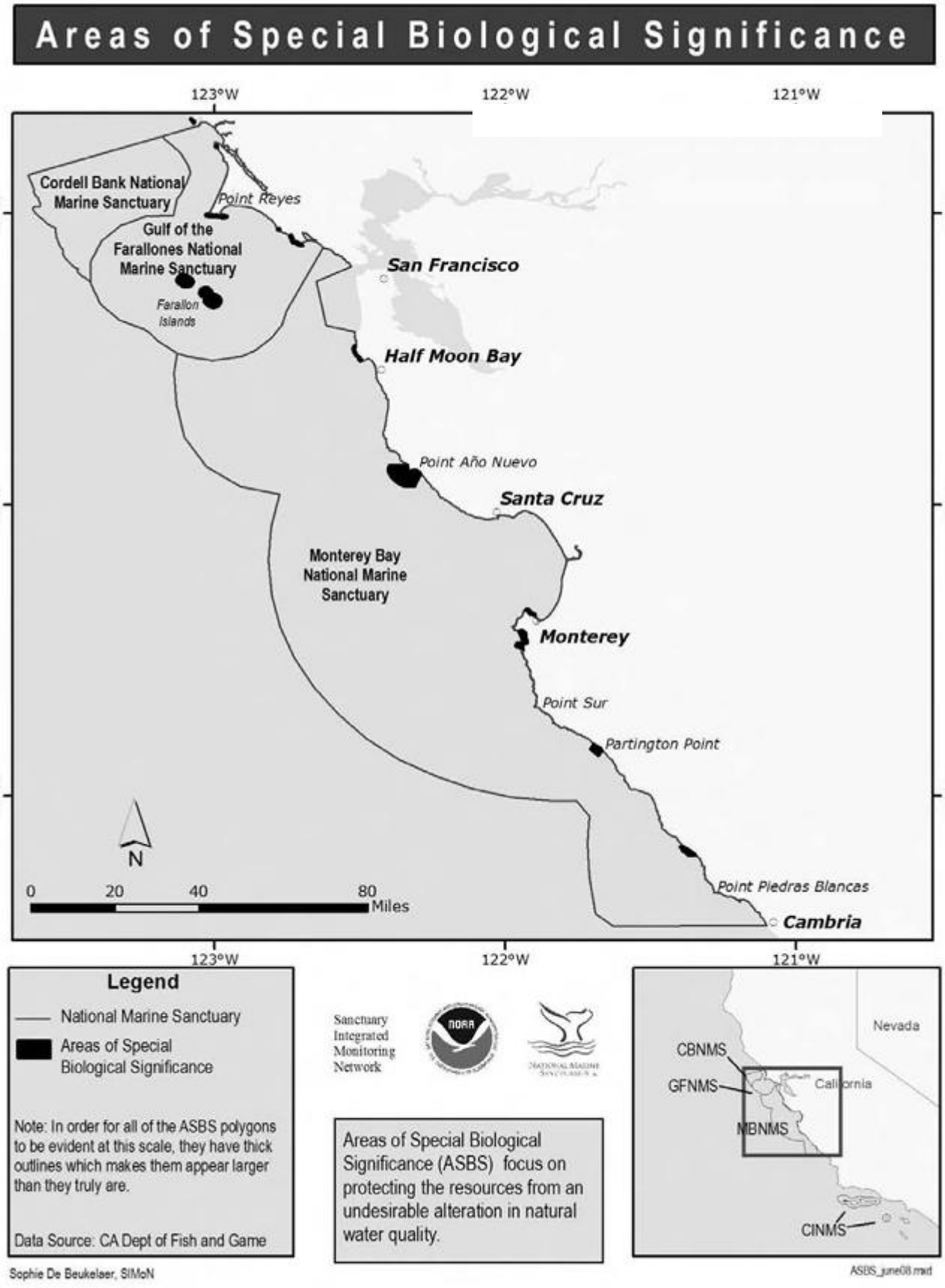
3.3 BIOLOGICAL RESOURCES

The ROI for biological resources is the 5,364 square nm km (18,422 square km; 7,113 square miles) of open ocean encompassed within the three sanctuaries, plus the 585 square nm km (2,007 square km; 775 square miles) of ocean included within the proposed Davidson Seamount addition to MBNMS. It also includes the near-coastal onshore environment along approximately 400 miles (644 km) of shoreline, which is about one-third of the California coast, in central and northern California. The ROI for the terrestrial biological resources analysis extends to 500 feet (152 meters) on the shore side areas of the sanctuaries.

Biological resources are plant and animal species and the habitats or communities in which they occur. This section is a discussion of regulatory considerations, general vegetation and wildlife species, sensitive or special status species, sensitive habitats, essential fish habitat (EFH), and wetlands. Addressed are onshore and offshore biological resource issues related to the Proposed Action and alternatives. These resources are marine mammals, sea turtles, birds, and benthic (bottom-dwelling) organisms, as well as terrestrial vegetation and wildlife resources and habitat adjacent to the shoreline of the ROI.

A large amount of biological data is available covering biological resources within the ROI. NOAA staff gathered this information for existing and future management efforts, to monitor conservation objectives, and as part of ongoing resource assessment and research. Some information on habitat suitability and species use of the ROI is provided in *A Biogeographic Assessment off Northern/Central California: To Support the Joint Management Plan Review for Cordell Bank, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries: Phase 1- Marine Fishes, Birds and Mammals* (NOAA 2003b) and *Ecological Linkages: Marine and Estuarine Ecosystems in Central and Northern California* (Airamé, Gaines, and Caldow 2003). The biogeographic assessment addressed key or locally important species and certain special status species of fish, marine mammals, and birds. This assessment determined species' use of the sanctuaries and abundance within the area. Figure 3-1 depicts the Areas of Special Biological Significance within the Sanctuaries.

The affected environment section is an overview of the key biological features of each Sanctuary, followed by a general description of habitat types, wildlife resources, and special status species found in the ROI. This section is a discussion in predominantly general terms of biological resources within the ROI. For a more detailed discussion on species and seasonal use changes within the ROI, please refer to MBNMS, GFNMS, and CBNMS FMPs, which precede this FEIS, the biogeographic assessment (NOAA 2003b), and the ecological linkages report (Airamé, Gaines, and Caldow 2003) mentioned above, as well as the resource characterizations on each site's Web site. In addition, Appendix C of this FEIS contains comprehensive lists of wildlife and plant species known to occur in each of the three sanctuaries.



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Areas of Special Biological Significance

Northern/Central California

3.3.1 Regional Overview of Affected Environment

CBNMS, GFNMS, and MBNMS are in coastal and marine habitats of central and northern California from Bodega Bay, in Sonoma County, to Cambria, in San Luis Obispo County. Each Sanctuary includes unique geological and biological features yet shares many other features due to its proximity and the influence of similar currents, seasonal upwelling, and weather patterns. Geological features in the ROI include a broad continental shelf, rocky shores, sandy beaches, coastal estuaries such as San Francisco Bay, Elkhorn Slough, and Tomales Bay, offshore banks and seamounts, such as Cordell Bank and Davidson Seamount, and the sloping edges of the continental shelf, dissected by deepwater canyons, such as the Monterey Submarine Canyon.

This unique combination of oceanographic conditions and undersea topography make the sanctuaries rich and diverse in a variety of marine species. This includes a wide array of temperate cold-water species and occasional influxes of warm-water species. The species diversity is directly related to the diversity of habitats and oceanic conditions, which are described in the following section, and the location of the sanctuaries within a broad transition zone providing a complex gradient of changing environments in which the relative proportions of species changes from north to south.

The species north of Point Conception, encompassing the entire study region and beyond right up through Washington State, are part of the Oregonian biogeographic province. The relative amount and location of upwelling and downwelling and, consequently, the amount of productivity seen along the coast are affected by seasonal weather patterns and the influence of the California and Davidson currents. The distribution of each species in the ocean is determined by a multitude of factors, including temperature, salinity, oxygen content, nutrient availability, current speeds and direction, species interactions, frequency of perturbation, and food availability.

Coastal bluff habitat occurs immediately shoreward of the coastline. Bluffs along the coasts drop steeply to intertidal areas that, depending on their location within the ROI, consist of sand, rock, or riprap. Beds of giant kelp *(Macrocystis pyrifera)* and bull kelp *(Nereocystis luetkeana)* occur offshore.

With respect to the terrestrial areas along the MBNMS and GFNMS coastlines, the most prominent physiographic feature is the California Coastal ranges. These mountains are composed of Tertiary sandstones overlaying Salinian granite basement rock. Along the coast these sandstones form the sea cliffs. Coastal streams, bays, estuarine lagoons, and sandy beaches complete the shoreline.

Cordell Bank National Marine Sanctuary

The waters around Cordell Bank provide valuable habitat for a variety of wildlife, including seabirds, marine mammals, fishes, and other species. In addition, many of these species are listed as threatened or endangered under the ESA. CBNMS provides critical foraging habitat for many species of seabirds. Seabird density over Cordell Bank can be among the highest of any area in central and northern California. Fifty-nine seabird species have been identified feeding in or near the Sanctuary. The composition of seabirds found at Cordell Bank is a mix of local breeding birds and highly migratory open-ocean species. While the local representatives use the nearby Farallon Islands and Point Reyes areas to nest, some migrants nest thousands of miles away. Black-footed Albatross *(Phoebastria nigripes)* and other migratory species use the productive waters around Cordell Bank as a stopover on their annual migration route. Hundreds of thousands of Sooty Shearwaters *(Puffinus griseus)* can be seen on days when they are migrating through the Sanctuary. Sanctuary waters are equally important to local breeders. Most of the worlds' small population of Ashy Storm-Petrels *(Cymochorea*

homochroa), which nest on Southeast Farallon Island, can be seen on the water near Cordell Bank. More than 20,000 Cassin's Auklets *(Ptychoramphus aleuticus)* have been counted in a single day. Some other regularly occurring Sanctuary species include the Northern Fulmar *(Fulmarus glacialis),* various Storm-Petrel species (family Hydrobatidae), Rhinoceros Auklet *(Cerorhinca monocerata),* Phalaropes (family Scolopacidae), and many species of gulls (family Laridae).

Twenty-six species of marine mammals (a combination of resident and migratory species) have been observed within the Sanctuary. Gray whales *(Eschrichtius robustus),* for example, pass Cordell Bank on their annual migrations between Arctic feeding grounds and Mexican breeding areas. The Dall's porpoise *(Phocoenoides dalli)* is one of the most frequently sighted marine mammals in the Sanctuary, along with humpback *(Megaptera novaeangliae)* and blue whales *(Balaenoptera musculus).* Individuals of all species use the Sanctuary as a destination feeding ground. Large numbers of the eastern Pacific humpback whales and blue whales feed during the summer within the Cordell Bank-Bodega Canyon area.

The harbor porpoise *(Phocoena sinus),* a species widely distributed in coastal waters but rarely seen offshore, is regularly observed within the Sanctuary's shallow areas. Pacific white-sided dolphins *(Lagenorhynchus obliquidens)* and northern right whale dolphins *(Lissodelphis borealis)* are abundant. Other cetaceans observed in the Sanctuary include Risso's dolphins *(Grampus griseus)* and killer whales *(Orcinus orca).*

The California sea lion *(Zalophus californianus),* the most abundant pinniped in California waters, has been observed in CBNMS more frequently and in greater numbers than other pinnipeds. The northern fur seal *(Callorhinus ursinus)* is also abundant in the area in late fall and winter (most of them use summer breeding grounds in the Channel Islands). Steller sea lions *(Eumetopias jubatus)* have decreased drastically in California in recent years, but Cordell Bank remains a feeding area for this species, possibly because of the abundance of rockfish *(Sebastes* spp.*)* and sardines. Nearby rookeries include Año Nuevo Islands and the Farallon Islands. The sea lions' winter haul-out grounds include Point Reyes and offshore rocks along the Sonoma County coast. Northern fur seals also occur in CBNMS.

More than 180 species of fishes have been identified in CBNMS. Many species of rockfish can be found at all depths and habitats on and around Cordell Bank. Cordell Bank provides critical habitat for young of the year, juvenile, and adult rockfishes. Lingcod *(Ophiodon elongatus)* are especially numerous in the wintertime, when they move up onto Cordell Bank to spawn. Many species of flatfish (order Pleuronectiformes) use the soft-bottom habitat around Cordell Bank, and albacore tuna *(Thunnus alalunga)* and salmon *(Oncorhynchus* spp.*)* frequent the Sanctuary seasonally. Albacore and salmon both feed on lanternfishes *(Myctophum punctatum),* which migrate nightly into shallow surface layers from deeper daytime haunts. The recovery of Pacific sardine *(Sardinops sagax)* populations is apparent in the waters surrounding Cordell Bank.

An abundant cover of benthic organisms can be seen on the upper rock surfaces of Cordell Bank. The high light penetration allows for algal photosynthesis far deeper than in nearshore coastal waters. The constant food supply washing Cordell Bank, combined with a hard substrate for attachment, provide ideal conditions that support a rich assemblage of benthic invertebrates. Space is the limiting factor on the upper pinnacles and ridges of Cordell Bank. Ridges are thickly covered (up to one foot thick in some places) with brightly colored sponges, anemones, hydrocorals, hydroids, and tunicates and scattered crabs, holothurians, and gastropods.

Gulf of the Farallones National Marine Sanctuary

GFNMS protects an area of 966 square nm (1,279 square miles; 3,250 square km) off the northern and central California coast. Located a few miles west of San Francisco, the waters within GFNMS are part of a nationally significant marine ecosystem. Encompassing a diversity of highly productive marine habitats, the Sanctuary supports an abundance of species.

One of the most spectacular components of this Sanctuary's abundant and diverse marine life is its nesting and migratory seabirds at the Farallon Islands. The Farallon Islands support the largest concentration of breeding seabirds in the contiguous US. Eleven of the sixteen species of seabirds known to breed along the US Pacific Coast have breeding colonies on the Farallon Islands and feed in the Sanctuary. For a list of these, please see the Offshore Islands section under Habitats below. In addition to the islands, the Sanctuary protects four estuaries, a lagoon, and one large coastal bay that provide foraging habitat for aquatic birds such as shorebirds, pelicans, loons, ducks, and grebes. These habitats are pristine compared to most coastal wetlands in California and provide habitat for thousands of migrating and wintering birds. More than 160 species of birds use the Sanctuary for shelter, food, or as a migration corridor. Of these, 54 species are known to use the Sanctuary during their breeding season.

Thirty-six species of marine mammals have been observed in GFNMS, including six species of pinnipeds (seals and sea lions), 28 species of cetaceans (whales, dolphins, and porpoises), and two species of otter. Many of these mammals occur in large concentrations and depend on the productive and secluded habitats for breeding, pupping, hauling out, feeding, and resting during migration.

Fish resources are abundant over a wide portion of the Gulf of the Farallones area. Because of the comparatively wide continental shelf and the configuration of the coastline, the area is vital to the health and existence of many fish, including salmon (chinook [*Oncorhynchus tshawytscha*] and coho [*O. kisutch*]), northern anchovy *(Engraulis mordax)*, rockfish, and flatfish species. The extension of Point Reyes and the resulting current patterns tend to retain larval and juvenile forms of these and other species within the area. The Farallon Islands act as an offshore mecca for shallow and intertidal fishes, which further enhance pelagic fishery populations (for example, anchovy, salmon, sardine, and tuna).

The Sanctuary includes many diverse habitats, thereby contributing to the region's high productivity. Bays and estuaries are especially important as feeding, spawning, and nursery areas for a wide variety of finfish, including Pacific herring, flatfish and rockfish. The rocky intertidal zone supports a specialized group of fishes adapted for life in tide pools, including monkey face pricklebacks *(Cebidichthys violaceus),* rock eels *(Xiphister mucosus),* dwarf surfperch *(Micrometrus minimus),* juvenile cabezon *(Scorpaenichthys marmoratus),* sculpins (family Cottidae), and blennies (family Blennidae). Many of these populations are important as forage for shorebirds and seabirds. Subtidal habitats support large populations of juvenile finfish. Nearshore pelagic environs are habitat to large predatory finfish, such as sharks and tunas, and forage fish and invertebrates such as anchovies, market squid *(Loligo opalescens)*, and Pacific mackerel *(Scomber japonicus).* Pelagic fish resources generally parallel species living in the nearshore subtidal zone. At the mid-depth or meso-pelagic range over sand and mud bottoms, bocaccio *(Sebastes paucispinis),* chilipepper *(S. goodei),* widow rockfish *(S. entomelas),* and Pacific hake *(Merluccius productus)* are abundant.

Significant algal and plant communities within the Sanctuary include kelp beds, salt marshes, and seagrass (e.g. eelgrass) *(Zostera pacifica*) beds. Kelp beds substantially increase the useable habitat for pelagic and demersal

species and offer protection to juvenile finfish. The highest concentration of kelp beds in the Sanctuary occurs along the mainland coast between Point Reyes Headlands and Bolinas lagoon.

Salt marshes offer food and protected habitat for many coastal species during vulnerable lifecycle stages. For example, the striped bass *(Morone saxatilis)* and some flounders (family Paralichthyidae) breed near salt marshes to allow juveniles to develop in the marsh system. Herons, sandpipers, ducks, rails, and geese also depend on the marsh for feeding and breeding.

Seagrass beds are situated on subtidal estuarine flats, in bays, and coastal inlets. Seagrass beds provide important breeding and nursery habitat for organisms such as Pacific herring, which attach their eggs to seagrass. Although some marine organisms feed directly on seagrass, the principal food chain supported by seagrass is based on detritus and the associated algae and phytoplankton.

Benthic fauna (communities of invertebrates living directly on or in the seafloor) differ according to habitat type and exist in all habitats of GFNMS (bays and estuaries, intertidal zones, nearshore, and offshore). Generally, each habitat area supports differing benthic assemblages of most classes, such as worms, clams, or crabs. The most conspicuous species include abalone (*Haliotis* spp.), crabs, and sea urchins (*Strongylocentrotus* spp.). Hundreds of other species are critical links in the food chains of fishes, birds, and mammals.

Monterey Bay National Marine Sanctuary

Similar to CBNMS and GFNMS, the unique and diverse environment of MBNMS is host to a multitude of biological resources. MBNMS is one of the most diverse marine ecosystems in the world, with numerous types of habitats, and a multitude of wildlife species, including 36 species of marine mammals, 94 species of seabirds, 345 species of fishes, and numerous invertebrates and plants. In addition to the kelp forests, rocky and soft bottom sub- or inter-tidal habitats, Monterey Canyon, unique hydrothermal vents and cool seeps, and deep-sea (pelagic) habitats, the many miles of rocky coastline support a variety of intertidal organisms.

Seabirds are relatively numerous at MBNMS compared to other portions of the west coast due to an abundance of prey and waters being nutrient rich as a result of the persistent upwelling plume produced by the California Current system that emanates southward from Año Nuevo Point, bringing nutrient rich water up to the surface. Seabirds heavily use MBNMS waters, with 94 species known to occur in the Sanctuary. Tidal and wetland areas, such as shores, marshes, and estuaries, are frequented by about 90 species of birds. Overall, many more seabirds are seasonally transient versus breeding or resident in MBNMS.

The waters of MBNMS provide wintering habitat for many species that use the rich prey resources that result from the upwelling. Due to the presence of submarine canyons in MBNMS, very deep water occurs within a few km of shore, and in fact this constitutes the predominant habitat in terms of total surface area of Sanctuary waters. As a result of this bottom topography, surface waters overlying these depths (over 6,562 feet deep; 2,000 meters deep;) provide habitat for deep water, or pelagic, birds, such as the Black-footed Albatross, Ashy Storm-Petrel, and Xantus's Murrelet *(Synthliboramphus hypoleucus)* during summer and fall, and Northern Fulmars and Black-legged Kittiwakes (*Rissa tridactyla*) during winter and early spring. Along the continental shelf break (656 to 6,558 feet; 200 to 1,999 meters), a relatively narrow habitat, seabird densities are also substantial. These waters are dominated by Sooty Shearwaters during spring and summer and by fulmars and gulls during winter; other characteristic species are Pink-footed (*Puffinus creatopus*) and Buller's Shearwaters (*P. bulleri*), Black Storm-Petrels *(Oceanodroma melania),* and Rhinoceros Auklets. Inshore of slope waters (greater than 200 meters; 656 feet deep), the prevalent bird species consist of Sooty Shearwaters,

Western Grebes *(Aechmophorus occidentalis),* Pacific Loons *(Gavia pacifica),* California Brown Pelicans *(Pelecanus occidentalis californicus),* Brandt's *(Phalacrocorax penicillatus)* and Pelagic Cormorants *(P. pelagicus),* Western Gulls *(Larus occidentalis),* and Common Murres *(Uria aalge).* In waters very close to shore, in the surf zone, are Surf *(Melanitta perspicillata)* and White-winged Scoters *(M. fusca)* and Marbled Murrelets *(Brachyramphus marmoratus marmoratus).*

There are a few breeding species in MBNMS. Since very little breeding habitat exists, locally breeding species typically occur in very small numbers, with the exception of the Brandt's Cormorant, which breeds in large numbers. Otherwise, typical breeding species are the Pelagic and Double-crested Cormorants *(Phalacrocorax auritus),* Western Gulls, Caspian Terns *(Sterna caspia),* Common Murres, Pigeon Guillemots *(Cepphus columba),* Rhinoceros Auklets, and Marbled Murrelets. Seasonal shifts and temporal shifts in seabird distribution have been observed at MBNMS. There is some evidence that the numbers of marine birds using MBNMS habitat have been declining, most likely due to a shift in ocean climate.

There are several species of special concern in MBNMS that are listed predominantly due to their small population sizes. Among these species are the endangered Brown Pelican (which had historic breeding ground in the Sanctuary), the threatened Marbled Murrelet (the MBNMS population is known to be the smallest, most disjunctive and, therefore, most precarious breeding population of this species), and several species being considered for listing (such as Black Storm-Petrel, Ashy Storm-Petrel, and Xantus's Murrelet). The world's largest known concentration of ashy storm-petrel can be found in Monterey Bay in the fall.

The Sanctuary also has a large assemblage of marine mammals for the same reasons that seabirds occur; that is, the high level of prey and the deep water habitats. There are six species of pinnipeds, 26 species of cetaceans, and one species of sea otter occurring (southern sea otter *[Enhydra lutris nereis]*). California sea lions occur with great frequency, but the fastest growing marine mammal population is the northern elephant seal *(Mirounga angustirostris),* with haul-out sites at Año Nuevo, Point Piedras Blancas, and isolated Big Sur beaches. Numerous species of large whales occur, several of which are listed under the ESA, including the humpback, fin *(Balaenoptera physalus)*, blue whale, sperm whale *(Physeter macrocephalus),* and, rarely, North Pacific right whale *(Eubalaena japonica).* Gray whales, recently delisted, are known migrants and pass through on both their southward and northward routes. In addition, minke whales *(Balaenoptera acutorostrata)* and several toothed whale species, such as killer whales and beaked whales (family Ziphiidae), occur.

Fish populations in MBNMS are diverse, including about 200 commercial and recreational fisheries species, as well as many other species. Anadromous fish, including coho and chinook salmon and steelhead, are an important part of the MBNMS ecosystem. Thousands of species of invertebrates inhabit MBNMS. Kelp forests, which support marine mammals, fishes, algae, and invertebrates, are prominent throughout nearshore waters. The marine algae found in MBNMS ranges from microscopic phytoplankton to seaweed and surfgrasses to giant kelp.

Approximately 24 wildlife species occurring in MBNMS are listed as threatened or endangered.

Davidson Seamount

Davidson Seamount, proposed to be included in MBNMS, is 120 km (75 miles) to the southwest of Monterey. One of the largest known seamounts in US waters, it is 26 miles (42 km) long and 8 miles (13.5 km) wide. From base to crest, Davidson Seamount is 7,546 feet (2,400 meters) tall, yet it is 4,265 feet (1,300 meters) below the sea surface. Davidson Seamount has an atypical seamount shape, with northeast-trending

ridges. Many undersea explorations have occurred here, resulting in characterizations of species patterns of distribution and abundance at the Seamount. Species associated with the Davidson Seamount can be divided into different habitats, including the sea surface habitat (birds in flight and sea surface), the mid-water habitat (0 to 4,101 feet; 0 to 1,250 meters;), below sea surface, the crest habitat (4,101 to 4,921 feet; 1,250 to 1,500 meters), the slope habitat (0.9 to 1.6 miles; 1,500 to 2,500 meters), and the base habitat (1.6 to 2.2 miles; 2,500 to 3,500 meters). The surface habitat hosts a variety of seabirds, marine mammals, and surface fishes. The mid-water habitat is patchy with marine "snow," organic matter that continually rains down from the sea surface, most likely providing an important food source for deep-sea animals. The crest habitat is the most diverse, including large gorgonian coral *(Paragorgia* sp.*)* forests, vast sponge fields, crabs, deep-sea fishes, shrimp (family Periclimenes), and basket stars (*Astrophyton muricatum*). The slope habitat is composed of cobble and rocky areas interspersed with areas of ash and sediment. This area hosts a diverse assemblage of sessile invertebrates and rare deep-sea fishes. Finally, the base habitat is the interface between rocky outcrops and the deep soft bottom. Species here are similar looking to their relatives in the nearshore, including sea cucumbers (*Holothuria leucospilota*), urchins (family *Echinometridae*), anemones (order *Actiniaria*), and sea stars *(Luidia* spp.*)*.

3.3.2 Habitat Types

The ROI is primarily aquatic although there are some terrestrial areas along MBNMS and GFNMS coastlines and offshore islands, largely consisting of coastal bluff vegetation. The ROI contains a broad diversity of habitats and micro environments due to geological, chemical, temperature, and topographic variation throughout. For the purpose of this document, habitats were divided into broader scale communities that have common elements and support a distinct array of species. Habitats are based on CDFG marine and estuarine habitat definitions (Shaffer 2002), as well as habitats discussed in the ecological linkages report (Airamé, Gaines, and Caldow 2003). Habitats within the ROI include coastal bluffs, intertidal zones, subtidal and nearshore waters, estuarine and lagoon areas, continental shelf and slope, offshore waters and offshore islands, and benthic zones. Within these habitats it is possible to find the following types of substrates or formations: rocky shores, sandy beaches, estuaries, lagoons and bays, subsurface ridges, lush kelp forests, islands, and underwater canyons. There are a variety of substrate types within the ROI that shape these habitats and the communities they support.

Coastal Bluff Vegetation

Coastal bluff vegetation includes vegetation growing from the higher high tide line to the bluff tops. These are harsh environments where plants must withstand strong winds with high salt content. Species from three communities described by Holland (1986) are included in this category: northern foredune, central dune scrub, and northern coastal bluff scrub. Due to the prevalence of invasive nonnative species, such as iceplant *(Carpobrotus edulis),* in this California habitat, almost all vegetation on the cliff top consists of nonnative plants. Along the coastal cliffs are Monterey pine *(Pinus radiata),* cypress *(Cupressus* spp.*),* eucalyptus *(Eucalyptus* spp.*),* and various ornamental shrubs and trees.

Intertidal Zone

Intertidal habitat, by definition, is found between the lowest and highest tidal level. This transitional area between sea and land is the strip of shore between the uppermost surfaces exposed to wave action during high tides and the lowermost areas exposed to air during low tides. Intertidal habitats vary in the type of material and the degree of exposure to surf they receive. Bottom habitat types include those of fine muds, sand, gravel, shale, cobble, boulders, and bedrock. Intertidal habitat within the ROI includes rocky and sandy

beaches. Rocky shores are found throughout the Gulf of the Farallones region, particularly at Bodega Head and Duxbury Reef. Approximately 56 percent of the coastline of MBNMS is composed of rocky shores.

Subtidal and Nearshore Waters

Subtidal and nearshore waters refer to the area from the lowest low tide line to the point where the seafloor drops and the deeper offshore waters begin. This is on the land side of the continental shelf-slope transition. The substrate can be sand, mud, or rock providing essential habitat for various algae, zooplankton, and phytoplankton species. All three sanctuaries contain significant areas of continental shelf habitats. Within CBNMS are rocky subtidal areas and nearshore waters that lead to soft sediment continental shelf and slope (and open ocean). The tops of Cordell Bank's ridges and pinnacles support large populations of sponges, anemones, hydrocorals, hydroids, tunicates, barnacles, crabs, worms, scallops, snails, chitons, and other algae and invertebrates. GFNMS is composed of a large expanse of the Pacific Ocean but includes nearshore tidal flats, rocky intertidal areas, rocky intertidal areas, kelp rafts, wetlands, subtidal reefs, and coastal beaches. This habitat supports fishes, birds, invertebrates, and algae. The Farallon Islands (26 nm west of the Golden Gate Bridge in the south-central part of GFNMS) are a major feature of GFNMS. In MBNMS the continental shelf area is bisected by Monterey Canyon, which helps transport cold nutrient-rich water to the surface, fueling a productive ecosystem. Elsewhere on the continental shelf, seasonal upwelling greatly contributes to the annual productivity of the area. Closer to shore, the vegetation is largely made up of marine algae and phytoplankton. The kelp forest is a prominent nearshore habitat within MBNMS that is defined and influenced by canopy-forest forming species of kelp (Shaffer 2002). Seagrass beds are another important component of nearshore subtidal habitat, as described in the GFNMS regional overview (Section 3.3.1).

Estuarine and Lagoon

An estuary is a water body that has regular exchange and interaction with ocean water, or a marine embayment with no more than a temporary separation from seawater; a lagoon is a water body often separated from ocean water exchange, with enclosure as a defining characteristic (Airamé, Gaines, and Caldow 2003). Bays and estuaries are among the most productive natural systems. Their physical, chemical, and biological characteristics are critically important to sustaining living resources. Wetlands and seagrass beds are also found in estuaries and serve as valuable microhabitats. Phytoplankton is the primary vegetation in the open water portion of these habitats.

Lagoons and estuaries bordering or found in the vicinity of the ROI include San Francisco Bay, Tomales Bay, Estero Americano, Estero de San Antonio, Abbott's Lagoon, Drakes Estero and Estero de Limantour, Bolinas Lagoon, Bodega Bay, Pescadero Marsh, and Elkhorn Slough. San Francisco Bay (483 square miles; 1,250 square km) and the Sacramento-San Joaquin Delta (1,158 square miles; 3,000 square km) are the largest estuaries on the California coast.

Continental Shelf and Slope

The continental shelf is the zone bordering a continent extending out from where there is permanent immersion, usually at about 328 to 656 feet (100 meters to 200 meters), where there is a marked or rather steep descent toward greater depths. The continental shelf is basically the extended perimeter of each continent. This area can be covered by relatively shallow seas (shelf seas) and gulfs. The shelf usually ends at a gradual slope called the shelf break, where the bottom sharply drops off into a steep slope, and then the sea bottom below the break is the continental slope. It usually begins at 430 feet (130 meters) depth and can be up to 12.5 miles (20 km) wide.

The continental slope, which is still considered part of the continent, together with the continental shelf, is called the continental margin. These very productive habitats occur in each of the three sanctuaries, CBNMS, GFNMS, and MBNMS. CBNMS lies 115 feet (35 meters) beneath the water's surface atop the northernmost seamount on the California continental shelf. Cordell Bank itself is on the continental shelf, about 43 nm northwest of the Golden Gate Bridge and 18 nm (21 miles; 32 km) west of the Point Reyes lighthouse. The main feature of this Sanctuary is an offshore granitic bank 4.5 miles wide by 9.5 miles long (7.2 km by 15.3 km), which contains sponges, ascidians, anemones, hydrocorals, and sea stars. Species density is highest on Cordell Bank, at depths shallower than 164 feet (50 meters). This rocky submerged island emerges from the soft sediments of the continental shelf, with the upper pinnacles reaching to within 120 feet (37 meters) of the ocean's surface. The continental shelf depth at the base of Cordell Bank is roughly 400 feet (121 meters).

GFNMS covers both the continental shelf and slope. From the shoreline to about 328 to 492 feet (100 to 150 meters) deep, the shelf is nearly horizontal, with rocky outcrops, gravel, sand, clay, silt, and deposits of broken shells covering it. The Farallon Islands themselves rise up from the continental shelf to the sea surface. About 25 miles (40 km) from the coast, the seafloor drops off, creating the continental slope with a grade of about 3 degrees. The slope is from 328 to 492 feet (100 to 150 meters) deep to about 2 miles (3,200 meters) and is covered with a more uniform sandy sediment.

In MBNMS, the central segment extends from the Point Año Nuevo area to south of Point Sur. It contains the most geologically diverse and physiographically varied seafloor within MBNMS. The Ascension-Monterey Canyon system, which has extensively dissected the continental shelf and slope in the Monterey Bay area, and the many heads of Sur Canyon, which have cut the continental slope just south of Point Sur, provide valuable habitat for many species.

Offshore Waters

Offshore waters refer to open water areas seaward from the continental shelf-slope transition (Shaffer 2002). Phytoplankton is the primary vegetation in this deep ocean habitat. Offshore habitats can be divided into pelagic waters and benthic communities. Several unique environments, such as cold seep, submarine canyon, and deep-seafloor microhabitats, are found in offshore waters, which is where upwelling takes place. Upwelling is part of the reason why such habitats support such unique assemblages of species. Two major impacts of upwelling are that it brings up cold nutrient-rich waters to the surface and it has an effect on animal movement. With regard to the movement of cold waters to the surface, this encourages seaweed growth and supports blooms of phytoplankton. The phytoplankton blooms in turn form the prey base for large animal populations higher in the food chain, such as fishes, marine mammals, and seabirds. Coastal upwelling ecosystems are some of the most productive ecosystems in the world and support many of the world's most important fisheries. With regard to providing a means for movement of organisms, upwelling that moves surface water offshore moves drifting larvae. Most marine fishes and invertebrates produce microscopic larvae as young, which drift in the water as they develop. Depending on the species, they may drift in ocean currents for weeks to months. Upwelling can infuse coastal waters with critical nutrients that fuel dramatic productivity.

Some of the areas known to have offshore water habitat include large submarine canyons, such as Monterey Canyon, which extend from shallow waters near their heads to the deep sea (Airamé, Gaines, and Caldow 2003). Deep-sea communities are found seaward of the continental shelf starting at water depths of 656 feet (200 meters). Seamounts are another offshore environment found in what is otherwise a fairly flat seafloor. The Pioneer Seamount, 1.2 miles (1,950 meters) above the seafloor, Gumdrop Seamount, 0.5 mile (800

meters) above the seafloor, and Davidson Seamount, 1.4 miles (2,300 meters) above the seafloor, are three such formations occurring within the ROI (Airamé, Gaines, and Caldow 2003). Cold seeps are regions on the seafloor that release sulfide- and methane-rich fluids and are common along the translational margin off central California (Airamé, Gaines, and Caldow 2003). Monterey Bay is an example of an active transform margin between the Pacific and North American plates, that is, a translational margin in which there is widespread distribution of fluid expulsion features.

Bodega Canyon is an example of offshore habitat, which marks the northern edge of Cordell Bank in CBNMS. The canyon provides excellent habitat for pelagic birds and marine mammals and creates an area with currents that bring in much of the nutrient-rich upwelling along the coast.

GFNMS is a prolific area of offshore water habitat, providing a valuable environment for species at all levels on the food chain. Just west of the Farallon Islands, the continental shelf drops off a submarine precipice, called the Farallon Escarpment, into a 6,000-foot (1,824 meters) abyss. This shelf break and the steep flanks of seamounts are near-vertical surfaces where upwelling occurs, and plant and animal plankton concentrate. These features draw predators across great distances to feast in the waters around the Farallon Islands. The Escarpment provides a localized area of high diversity within Sanctuary boundaries. During all seasons, the Farallon Escarpment consistently has the highest diversity of bird life.

Offshore Islands

There are over 100 offshore rocks and islands within the ROI that are host to breeding seabird colonies, including the well known Farallon Islands in the GFNMS and Año Nuevo Island in MBNMS. The Farallones, which contain the largest of the offshore islands, includes five granite islands located approximately 26 nm (29 miles; 48 km) west of San Francisco. The Farallones provide breeding habitat for Ashy and Leach's Storm-Petrels; Brandt's, Pelagic, and Double-crested Cormorants; Western Gulls; Common Murres; Pigeon Guillemots; and Cassin's and Rhinoceros Auklets. Black Oystercatchers *(Haematopus palliatus),* a shorebird, also breed on the Farallon Islands. Many other bird species occur, including the Short-tail Albatross *(Phoebastria albatrus)* and the Tufted Puffin (*Fratercula cirrhata).* Some of the small islands and rock outcrops are topped with sand and vegetation, though many become at least partially submerged and remain solid rock.

Just offshore from Point Año Nuevo, 46 miles (74 km) south of San Francisco, is Año Nuevo Island. This 25-acre low-lying island is part of the 4,000-acre Año Nuevo State Reserve. Two hundred years ago, the island was connected to the mainland by a narrow peninsula. Currently it is separated from the mainland by a channel that continues to grow wider. Año Nuevo Island has abundant wildlife, primarily seabirds and pinnipeds. This island is a highly sensitive habitat, and its use is restricted.

Benthic Communities

The benthic community is made up of organisms that live in and on the bottom of the ocean floor. Benthic species, which dwell on the seafloor, include worms, clams, crabs, sponges, and other organisms that live in the bottom sediments.

Benthic communities occur at CBNMS and other offshore reef areas such as Fanny Shoals in GFNMS or Point Sur in MBNMS. These deep reef areas provide critical habitat for a unique assemblage of fishes and invertebrates and are very different from shallow water communities. Fanny Shoals contains rocky areas that are excellent habitat for benthic assemblages and also is a known fishing spot for species such as albacore,

salmon, rockfish, and lingcod. In addition, upwelling and substantial offshore transport occur off Point Sur, where a coastal current flowing northward and extending from the surface to 656 feet (200 meters) deep has been studied. This northward flow contributes to convergence and offshore transport of water at Point Sur, which in turn affects distribution, transport, and survival of young fishes.

Various benthic habitats and substrates are found within the ROI. In addition, benthic communities occur in a variety of the habitats described in this section, including subtidal rocky reefs, kelp forests, soft bottom habitats, and deep ocean floor habitats. The continental shelf descends gradually from the coast to the shelf break. Benthic communities along the continental shelf are covered in part by a layer of mud. Outcropping bedrock and sand cover the continental shelf at depths greater than 295 feet (90 meters). Benthos play a critical role and make up a diverse group that are a major link in the food chain.

3.3.3 Wildlife Resources

The diverse array of habitats found in these sanctuaries are home to 36 marine mammals, 94 species of seabirds, at least 345 species of fishes, and hundreds of invertebrates and algae. Tables D-1 through D-3 in Appendix C list various general and special status species found in each of the respective sanctuaries.

Coastal Bluff Wildlife

The few wildlife species found in coastal bluff habitats include bird species that are primarily associated with other habitats in the area and that have stopped to feed or perch opportunistically or that nest in or along the cliff face. Sparrows, warblers, and hawks can be found along tree- and shrub-lined portions of the coastal bluff. Also, swallows, Pigeon Guillemot and Pelagic Cormorants breed and feed along coastal bluffs. Nesting sites of the Common Murre occur at the Devil's Slide area and Hurricane Point near Big Sur. Small rodents also may be associated with the nonnative plants that dominate the area, and the red fox *(Vulpes vulpes)* and black-tail deer *(Odocoileus hemionus columbianus)* is known to forage in this habitat (NOAA 2002).

Intertidal Zone

The intertidal habitat (the area between high tide and low tide lines) is biologically rich, supporting diverse assemblages of organisms. It is characterized by extreme conditions caused by wind, waves, and the fluctuation of tides. The animals inhabiting intertidal zones are subject to periodic immersion in water, followed by exposure to air. They must withstand varying degrees of wave shock, dramatic temperature changes, changes in moisture, attacks from both marine and terrestrial predators, and human-caused effects, such as trampling and collecting.

Four zones of rocky intertidal organisms are traditionally associated with different tidal heights. Species distributions are restricted according to physiological tolerance along the thermal and moisture gradient in the intertidal zone. The splash zone is almost always exposed to air, and has relatively few species. The high intertidal zone is exposed to air for long periods twice a day. The mid-intertidal zone is exposed to air briefly once or twice a day, and the low intertidal zone is exposed only during the lowest tides.

On unconsolidated muddy or sandy shores, algae are rare, and benthic diatoms are the only marine algae that may be present. On sandy beaches, much of the invertebrate life, such as worms, crustaceans, snails, and clams, dwell under unconsolidated substrate. Common crustaceans and mollusks include the beach hopper *(Megalorchestia californiana),* spiny mole crab *(Blepharipoda occidentalis),* and sand crab *(Emerita analoga)*. Common marine worms include: *Anatides groenlandica, Eteone dilate,* and *Euzonus* spp.,.

Rocky shores support a richer assortment of plants and animals. Algae includes numerous species of green, brown, and red algae, as well as beds of surfgrass. A wide variety of invertebrates, including anemones, barnacles, limpets, and mussels, compete for space with the algae in the intertidal zone. Mobile invertebrates, such as sea stars, snails, and crabs, often hide in crevices or under rocks, emerging to graze on algae or prey on other animals. Small fishes may also live in the small pools of water that fill up with each tidal cycle.

Typical intertidal invertebrate species of central and northern California include lined shore crab *(Pachygrapsus crassipes),* purple shore crab *(Hemigrapsus nudus),* isopods *(Idotea* spp.*),* California mussels *(Mytilus californianus),* periwinkles *(Littorina* spp.*),* lemon nudibranch *(Anisodoris nobilis),* troglodyte chiton *(Nuttallina californica),* bat star *(Asterina miniata),* black turbin snail *(Teynla funebralis),* the giant green anemone *(Anthopleura xanthogrammica),* aggregating anemone *(Anthopleura elegantissima)* and other species of bryozoans, nudibranchs, sponges and tunicates (UC Santa Cruz 1996). Intertidal fishes, such as the crevice kelpfish *(Gibbonsia montereyensis)* and the tide pool sculpin *(Oligocottus maculosus),* are limited to tide pools or to passing through the intertidal zone at high tide.

Birds forage in the intertidal zone at low tide or breed and roost in the cliffs just above the shore. There are a great many species of shorebirds along the beaches of the ROI, including Sanderlings *(Calidris alba);* Short-billed Dowitchers *(Limnodromus griseus);* and Western, Glaucous-winged *(Larus glaucescens),* and California Gulls *(L. californicus).* Shorebirds, such as Sanderlings and Dowitchers, routinely forage in the receding surf, an indication that there are sand-dwelling crustaceans. Another bird found in this area is the Snowy Plover *(Charadrius alexandrinus nivosus),* whose threatened status has resulted in some significant resource management actions in central California including restrictions on access or types of use in some shoreline areas. Some typical shorebird breeders in this habitat include the Snowy Plover, Black Oystercatcher, Killdeer *(Charadrius vociferus),* Sanderlings, Willets *(Catoptrophorus semipalmatus),* and Marbled Godwits *(Limosa fedoa).*

Brown Pelicans, Surf Scoters, grebes, cormorants *(Phalacrocorax* spp.*),* and many seabird species can be found in water beyond the breaking waves or flying through the area. Caspian and Forster's Terns *(Sterna forsteri)* and, Whimbrels *(Numenius phaeopus)* are some of the summer migrants that forage along the coastal beaches. Winter migrants include loons *(Gavia* spp.*),* Willets, Black-bellied Plovers *(Pluvialis squatarola),* Marbled Godwits, and Turnstones *(Arenaria melanocephala).*

Marine mammals are also found in this habitat. Pacific harbor seals, and California sea lions are frequently seen seaward of the surf zone; sea otters, and Steller sea lions are occasional visitors. Seals and sea lions haul out on intertidal shores for warming and breeding.

Subtidal and Nearshore Waters

Subtidal habitats (shallow-water areas below mean low water) and nearshore waters (shallow inshore waters; inshore waters are waters of the shallower part of the continental shelf, also known as onshore waters) support many different species. A comprehensive list of key species in this habitat is in the Biogeographic Assessment (NOAA 2003b) and the ecological linkages report (Airamé, Gaines, and Caldow 2003).

Krill (euphausiids), a crucial or "keystone" species in the ROI, occur in all three sanctuaries. They are small, shrimp-like crustaceans that congregate in large dense masses called swarms or clouds. Two krill species form the primary forage for upper trophic levels in the Sanctuaries. Krill feed on phytoplankton and are very important in the food web since many other species of bird, fish and animals. Krill form a key trophic link in coastal upwelling systems between primary production and higher trophic level consumers. Most marine

predators subsist at least part of the year on krill, which is the primary prey of seven of the ten most important commercial fishes on the central California coast. Krill are also very important food sources for baleen whales and seabirds.

The nutrient-rich sanctuary waters provide forage for the largest concentration of breeding seabirds in the continental US. More than 120 species of birds use these three sanctuaries for shelter, food, or as a migration corridor. Of these, over 40 species are known to use the Sanctuary during their breeding season. These same productive waters also support a variety of marine mammals, including gray whales *(Eschrichtius robustus),* humpback whales *(Megaptera novaeangliae)*, blue whales *(Balaenoptera musculus),* Dall's porpoise *(Phocoenoides dalli),* harbor porpoise *(Phocoena sinus),* Pacific white-sided dolphins *(Lagenorhynchus obliquidens),* northern right whale dolphins *(Lissodelphis borealis)*, Risso's dolphins *(Grampus griseus)* and killer whales *(Orcinus orca)*. Some species, such as the gray whale are only seasonal migrants, others travel to the area to feed (blue and humpback whales, killer whale), and yet others can be found year-around (harbor seals, sea lions).

Six species of pinnipeds are found in the ROI, some of which are federally listed. Pinnipeds spend a large amount of time in offshore waters, or on offshore islands, but some of the rookeries (breeding places or breeding colonies usually crowded with the same species) or haul-out areas occur in this habitat. Species found in the ROI are California sea lion, Pacific harbor seal, Steller sea lion, northern elephant seal, northern fur seal, and on occasion, the Guadelupe fur seal *(Arctocephalus townsendi)*. The various species have numerous seal rookeries or colonies throughout the ROI and are found in the sanctuaries at different times of the year, feeding on the abundant fish and invertebrate resources of the island shelves or hauling out on rocks and beaches.

A variety of fish species occur within these habitats, including rockfishes, cabezon, surfperch (family Embiotocidae), wrasses (family Labridae) and senorita *(Oxyjulius californica)*. Commerically harvested species include salmon, tuna, crab, squid, and various rockfish. The salmon, crab, and squid fisheries are among the most important ones in the sanctuaries. The West Coast Dungeness crab fishery is considered the most sustainable large-scale commercial crab fishery in the world. Both chinook and coho salmon are coastal migrants. They are mobile, nonresidential, nearshore pelagic species. Commercial landings from open-water habitats represented 36 percent of the total landings at ports near the Sanctuaries from 1981 to 2000. Further information about commercial fishing is found in Section 3.6, Commercial Fisheries.

Kelp forests support a variety of species, including sea otters and sea urchins. Other marine mammals, such as harbor seals and California sea lions, are common in and around kelp forests, as are a variety of fishes, such as the señorita *(Oxyjulius californica),* the kelp surfperch *(Brachyistius frenatus),* blue rockfish *(Sebastes mystinus),* and olive rockfish (*S. serranoides)*. The kelp canopy, stipes, and holdfasts increase the available habitat for nearshore species and offer protection to juvenile finfish. Bat star *(Asterina miniata),* sea lemon *(Anisidoris nobilis),* barnacles *(Balanus* spp.*),* red volcano sponge *(Acarnus erithacus),* and urchin are a few of the many types of invertebrates that inhabit the kelp forest and rocky subtidal habitats.

Estuarine and Lagoon

Estuaries and lagoons serve as important habitats for many fishes, birds, and mammals. They provide suitable habitat for reproduction, feeding, resting, and cover. Estuaries and lagoons support unique biological communities with both aquatic and terrestrial characteristics. Halophytic vegetation, such as pickleweed *(Allenrolfea occidentalis),* grows higher in the marsh where flooding occurs less frequently and salt may become concentrated. However, little vegetation can grow in areas characterized by high evaporation and high soil

salinity. A diverse assemblage of wetland plants grows in areas near tidal creeks where fresh water input is high. As the plant matter breaks down into detritus, it is consumed by various filter feeders, deposit feeders, and other omnivores and scavengers. These species, in-turn, provide abundant food resources for other species of fish, birds and mammals. Brackish water supports a distinctive assemblage of invertebrate and fish species, including the endangered tidewater goby *(Eucyclogobius newberryi),* delta smelt *(Hypomesus transpacificus),* and the stickleback *(Gasterosteus aculeatus leiurus).* Other estuarine species can include jacksmelt *(Atherinopsis californiensis),* Pacific sardine, Pacific herring *(Clupea pallasii),* staghorn sculpins *(Leptocottus armatus),* several rockfishes, salmonids, clupeids *(Clupeleonella* ssp.*),* and embiotocids *(Embiotocidae).*

The estuaries and bays of coastal California are part of the Pacific Flyway, one of the four principal bird migration routes in North America. San Francisco Bay supports a large number of migratory and resident birds. Also important for birds are Tomales Bay, Bolinas Lagoon, Pescadero Marsh, and Elkhorn Slough. Bolinas Lagoon and Tomales Bay are designated wetlands of significant international importance under the Convention on Wetlands. Marine mammals, including harbor seal, harbor porpoise, and sea otter, occur in these bays.

Seagrass beds, which occur in the bays and lagoons, are highly productive habitats that support a unique assemblage of invertebrates and fishes. Many fishes, including Pacific herring, spawn in seagrass beds among other habitats. The structure of seagrass beds provides protection from predation for juvenile invertebrates and fishes. Large numbers of shorebirds and waterfowl are attracted to seagrass beds, where they feed on the seagrass, fishes, and invertebrate eggs and young. (See sandy beach, rocky intertidal, and offshore island communities sections.)

Offshore Waters

Offshore waters tend to represent the more oceanic waters, though they still may relate to outer continental shelf waters. These are waters beyond the nearshore zone which are always submerged.

Whale species, such as the gray whale, blue whale*,* humpback whale*,* killer whale, and many others, are seen seasonally within the sanctuaries, with some evidence of certain species having a small number of year-round residents (NOAA 2002; CBNMS 2004). A variety of seabirds, such as the Black-legged Kittiwake and Rhinoceros Auklet, forage in and inhabit the ROI.

A small number of pelagic species support the fisheries of central and northern California, including northern anchovy, Pacific sardine*,* Pacific mackerel, and jack mackerel *(Trachurus symmetricus).* Other fishes known to this area include the Pacific butterfish *(Peprilus simillimus),* opah *(Lampris guttatus),* blue shark *(Prionace glauca),* common thresher shark *(Alopias vulpinus*), and mako shark *(Isurus oxyrhinchus)* (NOAA 2002).

Offshore Islands

Offshore islands provide important habitat for a large number of marine mammal and seabird species. Some marine mammals use the islands for rookeries and as essential haul-out sites. The islands also provide important breeding sites for a variety of seabirds.

The Farallon Islands, which are protected as a National Wildlife Refuge, are home to the largest concentration of breeding seabirds in the contiguous United States, as well as one of the richest assemblages of pinnipeds (six species; see subtidal and nearshore waters section). Eleven of the 16 species of seabirds known to breed along the US Pacific coast have breeding colonies on the islands. Breeding colonies at the

Farallon Islands include Ashy and Leach's Storm-Petrels *(Oceanodroma leucorhoa)*, Brandt's, Pelagic and Double-crested Cormorants, Western Gulls, Common Murres, Pigeon Guillemots, Rhinoceros Auklets, Cassin's Auklets, and Tufted Puffins.

The Farallon Islands provide critical habitat for breeding northern elephant seals and Californian sea lions. Also, northern fur seals have been sighted on the islands for the first time in decades.

Current studies show that there may be a semiresidential group of white sharks *(Carcharodon carcharias)* that inhabits the waters off the Farallons. Photo identification and mark recapture studies indicate that certain individual animals revisit the area yearly. It may be that sharks are engaging in annual feeding or reproductive activities and may even exhibit "territories." Thus, the individual animals in this area may be likely to experience frequent or cumulative encounters with humans and vessels since there has been an increase in recent years in ecotourism focused on white shark viewing and diving. Shark ecotourism is further discussed in Sections 3.11, Public Access and Recreation, and 3.13, Socioeconomics.

Año Nuevo Island supports an abundant wildlife population. The island contains nesting colonies of sea birds, including the Rhinoceros Auklet, Cassin's Auklet, Brandt's Cormorant, Black Oystercatcher, and Western Gull. California Brown Pelicans are also seen there, although they do not use the island for breeding. It also serves as a breeding ground for northern elephant seals, Pacific harbor seals *(Phoca vitulina),* California sea lions, and federally endangered Steller sea lions. Northern fur seals and federally threatened southern sea otters are occasional visitors. The elephant seal population is the most predominant and has recovered to the carrying capacity of the island, extending to the mainland. Several systematic, long-term, species monitoring efforts have taken place on Año Nuevo.

Benthic Communities

Benthic fauna communities refer to invertebrates living directly on or in the seafloor. Benthic fauna communities differ according to habitat type and exist in all habitats of the Sanctuary (bays and estuaries, intertidal zones, nearshore, and offshore). The different sediments and the range of depths on the continental shelf provide diverse habitats for a variety of marine invertebrates. Soft bottom habitats lack the physical structure and high production associated with kelp forests and rocky reefs. Generally, each habitat area supports differing benthic assemblages of most classes, for example, worms, clams, or crabs. Hundreds of species (including sea stars, clams, amphipods, and shrimp) are critical links in the food chains of fishes, birds, and mammals. Species that live on the continental shelf (which provides structure for species such as sea pens and small invertebrates) are subjected to shifting sediments due to wave action. Some species find shelter from the shifting sands by living in tubes and burrows. Clams are permanently buried in the sand with their siphons extended to the surface. Some crustaceans and mollusks live beneath the sand, emerging at night to forage. Dungeness crabs *(Cancer magister),* which are the most economically important crabs in the area, are concentrated on sandy to sandy-mud bottoms from the intertidal zone to approximately 330 feet (100 meters).

Brown and red rock crabs *(C. antennarius* and *C. productus)* are found on rocky substrate, while yellow rock crabs *(C. anthonyi)* inhabit open sand or soft bottom habitats. Concentrations of ocean shrimp *(Pandalus jordani)* are found on green mud and mud-sand bottoms at depths of 164 to 1,312 feet (50 to 400 meters). Sea pens *(Ptilosarcus gurneyi),* octopus *(Octopus rubescens),* benthic squid (*Rossia* ssp.*),* and the sea star are examples of large epifaunal invertebrates found at depths in Monterey Bay of 197 to 328 feet (60 to 100 meters).

Estuarine fishes, such as the California halibut *(Paralichthys californicus)* and leopard shark *(Triakis semifasciata),* occupy benthic habitats in Tomales Bay and other estuaries. Flatfish, including various sole, halibut, flounder, turbot, and sanddab *(Citharichthys* spp.*),* are camouflaged on the sandy surface of the seafloor. Other benthic fish species found within the ROI include English sole *(Parophrys vetulus)* and Dover sole *(Microstomus pacificus).* Many rockfish species, such as widow, yellowtail *(Sebastes flavidus),* canary *(S. pinniger),* shortbelly *(S. jordani),* and vermilion *(S. miniatus),* bocaccio, and Pacific ocean perch *(S. alutus),* are found in the ROI (see Appendix C for complete listing; note that widow rockfish, canary rockfish, and Pacific ocean perch are listed as overfished species in the Sanctuaries). Some rockfish species are associated with rocky features on the continental shelf and slope and in submarine canyons.

Ophiuroids or brittlestars, such as *Ophiomusium glabrum, Amphiura carchara,* and *Amphilepis platytata,* are the dominant megafauna in many areas of the deep sea (Airamé, Gaines, and Caldow 2003). Seamounts, with their rocky substrate and higher elevations, support a high biomass with a diverse assemblage of species. Deep-sea communities contain unique species adapted to the extremely high pressure and low light conditions. Grenadiers *(Coryphaenoides* spp.*),* snailfish *(Paraliparis rosaceus),* and finescale codling *(Antimora microlepis)* are some of the highly specialized species that survive in the extreme conditions of the deep sea. Vesicomyid clams *(Calyptogena* spp.*)* are the dominant species at cold seeps off central and northern California (Airamé, Gaines, and Caldow 2003).

Sensitive Species and Habitats

There are many sensitive or biologically significant habitats in the ROI. Sensitive habitat can consist of a diverse category of habitats but includes areas such as wetlands, marine habitats, sand dunes, sea cliffs, and other such habitats that support rare, endangered, threatened, or unique species. Biologically significant habitats are those identified as environments that support a high diversity of species or an abundance of individuals and that have some ecological significance. To assess the location and size of these areas, NOAA surveyed the ROI for the location and abundance of key species (Tables C-1 through C-3 in Appendix C). Figure 3-1 depicts the Areas of Special Biological Significance within the Sanctuaries.

In addition, this section identifies special status, or sensitive, species that may occur in the ROI. Sensitive species include those that the US Fish and Wildlife Service (USFWS), the NOAA-Fisheries, or the CDFG lists or has proposed for listing as endangered, threatened, or candidate species. Plants that the California Native Plant Society (CNPS) lists as rare or threatened are also considered sensitive. Federal and state regulatory agencies also consider species for which listing is not presently necessary but that have suffered noticeable and substantial declines in population or that have lost significant habitat that puts them at likely risk of a population decline. These are known as species of concern and are monitored and considered in planned actions in order to avoid future listing. There are many such species of concern found within the ROI, such as the common loon *(Gavia immer)* and Pacific lamprey *(Lampreta tridentate).* In order to assess any potential impacts on sensitive species from project actions, including conservation actions, an ESA Section 7 consultation has taken place. This process started with the publication of the DEIS.

Potential sensitive species in the ROI were identified from the biogeographic assessment (NOAA 2003b) and the ecological linkages report (Airamé, Gaines, and Caldow 2003), as well as from the respective Sanctuary Web sites, other relevant literature, and personal communications with Sanctuary personnel. Lists of sensitive species and critical habitat found in the respective sanctuaries are provided in Appendix C. The federal designations of these species, as well as a comprehensive list of all special status species known to occur or likely to occur in the respective sanctuaries, are listed in Tables C-1 through C-3, in Appendix C.

The following discussion is meant to provide a broad overview and summary discussion of the majority of sensitive or special status species in the ROI; certain species are profiled in more detail.

Numerous endangered species are known to reside in or migrate through the sanctuaries. Federally listed endangered marine mammals include the blue whale, fin whale, humpback whale, North Pacific right whale, sei whale *(Balaenoptera borealis),* sperm whale, Steller sea lion, northern fur seal, Guadelupe fur seal, and southern sea otter.

Sperm whales frequent waters of the continental slope and in the vicinity of seamounts where subsurface topography is steep. Large baleen whales, including blue, gray (formerly a listed species), humpback, and fin whales, either migrate through the waters of coastal California or move into the area to feed during the summer and fall. Large numbers of blue and humpback whales feed in the vicinity of Cordell Bank, the Farallon Islands, and Monterey and Bodega canyons. During their nonbreeding season, northern fur seals are the most abundant pinnipeds over the continental slope off California. Several fishes listed as endangered are known to inhabit the ROI. They include the chinook salmon spring, fall/late fall, and winter run evolutionarily significant unit (ESUs), steelhead central and south-central California coast salmon *(Oncorhynchus mykiss irideus),* tidewater goby, white sturgeon *(Acipenser transmontanus),* and green sturgeon *(A. medirostris).*

Sanctuary waters are among the most productive and biologically diverse in the world as measured by the sheer number of seabirds supported year-round and the numerous marine mammal species found in the ROI. These waters are also important to several species of special concern because of their small world populations. In GFNMS alone, a total of 27 bird species that are federally listed as threatened, endangered, or a species of concern can be found. Federally listed endangered bird species known in the ROI include Short-tailed Albatross *(Phoebastria albatrus),* California Brown Pelican, California Clapper Rail *(Rallus longirostris obsoletus),* Western Snowy Plover, California Least Tern *(Sterna antillarum browni),* Marbled Murrelet, and Xantus's Murrelet.

Four federally threatened or endangered sea turtles are known to occur in the ROI. They are the green sea turtle *(Chelonia mydas),* loggerhead sea turtle *(Caretta caretta),* olive (Pacific) ridley sea turtle *(Lepidochelys olivacea),* and leatherback sea turtle *(Dermochelys coriacea).*

Sensitive terrestrial species found in the ROI are the state and federally endangered San Francisco garter snake *(Thamnophis sirtalis tetrataenia)* and the state and federally endangered salt marsh harvest mouse *(Reithrodontomys megalotis distichlis)*. The salt marsh harvest mouse is the one terrestrial mammal known to occur in habitat within the ROI; it is found in salt water marshlands near the coast.

Essential Fish Habitat (EFH) is defined by the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (Magnuson-Stevens Act, 16 USC § 1801 *et seq.*). EFH refers to those waters and substrate necessary to fishes for spawning, breeding, feeding, or maturing and includes coral. Certain EFH areas are known as habitat areas of particular concern (HAPC, a subset of EFH). EFH was designated by the MSA, which calls for direct action to "stop or reverse the continued loss of fish habitats." EFH exists in the ROI. It is extensively covered in the most recent EIS published in December 2005 entitled Pacific Coast Groundfish Essential Fish Habitat Designation and Minimization of Adverse Impacts and is available on the Internet at http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/NEPA-Documents/EFH-Final-EIS.cfm. The final rule implementing the EFH designation and management

measures was published on December 29, 2006 (50 CFR Part 660). This EIS and rule amends the Pacific Coast Groundfish Fishery Management Plan (GFMP), pursuant to the MSA to describe and identify EFH for the fishery, to designate HAPCs, to minimize to the extent practicable the adverse effects of fishing on EFH, and to identify other actions to encourage the conservation and enhancement of EFH. The project area for this action extends from the seaward boundary of the Pacific Coast Exclusive Economic Zone shoreward to the inland extent of estuaries. This project area overlaps in many areas within the ROI. While the Proposed Action of this EIS does not specifically protect EFH, this EIS assumes that the Pacific Coast EFH will be adopted and all its recommendations incorporated.

As of June 2007, there are seven groundfish species declared overfished: bocaccio, Pacific Ocean perch, canary rockfish, darkblotched rockfish, widow rockfish, yelloweye rockfish, and cowcod. Each of these species has a rebuilding plan developed and tracked by the Pacific Fishery Management Council.

Davidson Seamount is an ecologically important area that provides habitat for rare fishes, old coldwater corals, and massive sponge communities. The surface habitat hosts a variety of seabirds, marine mammals, and surface fishes, including Albatross, Shearwaters, jaegers (*Stercorarius* spp.*),* sperm whales, killer whales, albacore tuna, and ocean sunfish. Rare organisms, such as swimming worms (an undescribed mollusk) and red jellyfish *(Tiburonia granrojo),* have been seen above Davidson Seamount.

Introduced Species

Introduced species (also known as nonnative, invasive, or exotic species) are present in the marine and estuarine environment and are a major environmental threat to living resources and habitats of all three sanctuaries. Introducing invasive species into waters where they are not already established is an issue that has received much attention in recent years. The introduction of invasive species, also sometimes called aquatic nuisance species (ANS) or fouling organisms, is considered a significant threat to water quality and is capable of disrupting native marine ecosystems. ANS are organisms "that invade ecosystems beyond their natural, historic range. Their presence may harm native ecosystems or commercial, agricultural, or recreational activities dependent on these ecosystems" (USFWS 2007). Introduced species (hereafter both "introduced species" and "ANS" are used to described invasive species) are nonindigenous species, which threaten the diversity or abundance of native species (especially threatened and endangered species), alter native species composition, and interfere with the ecosystem's function, often threatening the ecological stability of the infested waters. They may cause local extinction of native species either by preying on them directly or by out-competing them for prey. For example, the European green crab, now found in Elkhorn Slough, Tomales Bay, Bodega Bay, Bolinas Lagoon, Estero de San Antonio, and Estero Americano, preys on the young of valuable species (such as oysters and Dungeness crab) and competes with them for prey and suitable habitats. Introduced species may cause changes in physical habitat structure.

Once established, introduced species can be extremely difficult to control or to eradicate. Hundreds of federal programs, state organizations, international organizations and non-profit organizations have established databases, community outreach, monitoring, eradication, research and education programs. Additional information on the issues associated with introduced species is provided in Section 2.2.1.

3.3.4 Regulatory Environment

There are numerous federal and state laws and regulations providing protection of biological resources in the sanctuaries. An overview of some of the primary regulations and regulating agencies are summarized below (note that this list is not comprehensive).

Federal Clean Water Act, 33 USC §§ 1251-1387

The USACE and EPA have primary federal responsibility for administering regulations that concern waters and wetlands. The USACE acts according to the Rivers and Harbors Act (Sections 9 and 10), which regulates placement of structures or other work in addition to fill in "navigable waters," and the CWA (Section 404), which governs fill in "waters of the United States," including wetlands. A USACE permit is required if a project would place structures within navigable waters or if it would result in altering waters of the US below the ordinary high water mark in nontidal waters. The USACE does not issue these types of permits in cases where the USACE itself is the lead agency; instead it evaluates the project to determine compliance and acceptability. The primary criteria for evaluating the biological impacts of the USACE permit actions in wetlands is provided by the USEPA, but the mandates of other federal agencies apply as well. Those agencies include, but are not limited to, the USFWS and the National Marine Fisheries Service (NMFS). Additional enforcement of the CWA is provided by the State Water Quality Resources Control Board (SWQRCB), which must certify that a USACE permit action meets state water quality objectives (Section 401, CWA).

Endangered Species Act, 16 USC §§ 1531 – 1544

The ESA protects plant and animal species (and their habitats) that are listed as endangered or threatened. Species are listed as endangered if found to be in danger of extinction throughout all or a significant portion of their ranges; species are listed as threatened if they are likely to become endangered within the foreseeable future. The ESA also protects designated critical habitat for listed species, which are areas of physical or biological features essential to the conservation of the species and which may require special management considerations. The ESA requires federal agencies to consult with USFWS and/or NMFS, as applicable, before initiating any action that may affect a listed species.

Magnuson-Stevens Fishery Conservation and Management Act, 16 USC § 1801 et seq.

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the US claimed sovereign rights and exclusive fishery management authority over all fish, and all Continental Shelf fishery resources, within the EEZ (the area from the seaward boundary of each coastal state out to 200 nm). The MSA established a procedure for authorizing foreign fishing, and prohibited unauthorized foreign fishing within the EEZ.

The MSA also established national standards for fishery conservation and management within the EEZ, and created eight Regional Fishery Management Councils composed of state officials with fishery management responsibility, the regional administrators of NOAA Fisheries, and individuals appointed by the Secretary of Commerce who are knowledgeable regarding the conservation and management, or the commercial or recreational harvest, of the fishery resources of the geographical area concerned. The Councils are responsible for preparing and amending fishery management plans for each fishery under their authority that requires conservation and management.

Fishery management plans (FMPs) describe the fisheries and contain necessary and appropriate conservation and management measures, applicable to foreign vessels in US waters and fishing by US vessels. The plans are submitted to the Secretary of Commerce, who has delegated to NOAA approval of the plans. If approved, NOAA Fisheries promulgates implementing regulations. NOAA Fisheries may prepare Secretarial FMPs if the appropriate Council fails to develop such a plan.

Of particular relevance to this FEIS are recent changes to the Groundfish FMP. Amendment 19 has been prepared by NOAA Fisheries and the PFMC to comply with Section 303(a)(7) of the MSA by amending the Pacific Coast Groundfish FMP to:

- Describe and identify essential fish habitat (EFH) for the fishery;
- Designate Habitat Areas of Particular Concern (HAPC);
- Minimize to the extent practicable the adverse effects of fishing on EFH; and
- Identify other actions to encourage the conservation and enhancement of EFH.

The proposed rules and management measures are intended to minimize, to the extent practicable, adverse effects on Groundfish EFH from fishing. On May 11, 2006, NOAA Fisheries published a final rule to implement regulatory provisions of Amendment 19 to the Pacific Coast Groundfish FMP (71 FR 27408). This rule designated the areas within the 50-fathom isboath of Cordell Bank and the Davidson Seamount Management Area (as well as other areas in the ROI) as EFH, and implemented the following prohibitions as applicable within these EFH areas:

- Fishing with dredge gear anywhere in EFH;
- Fishing with beam trawl gear anywhere in EFH;
- Fishing with specified types of bottom trawl gear anywhere in EFH;
- Fishing with bottom contact gear within 50 fathoms of Cordell Bank; and
- Fishing with bottom contact gear or any other gear that is deployed deeper than 500 fathoms (3000 feet) within the Davidson Seamount.

Fish and Wildlife Coordination Act and Implementing Regulations, 16 USC §§ 661 – 666c

Any federal agency that proposes to control or modify any body of water must first consult with the USFWS or NMFS, as appropriate, and with the head of the appropriate state agency exercising administration over the wildlife resources of the affected state. The USACE has a memorandum of understanding with the USFWS to provide a coordination act report to assist in planning efforts.

Migratory Bird Treaty Act, 16 USC § 703 et. seq.

The MBTA is a federal statute that implements US treaties with several countries concerning the conservation and protection of migratory birds. The number of bird species covered by the MBTA is extensive and is listed at 50 CFR 10.13. Further, the regulatory definition of a migratory bird is broad and includes any mutation or hybrid of a listed species, as well as any part, egg, or nest of such bird (50 CFR 10.12). Migratory birds are not necessarily federally listed endangered or threatened under the ESA. The MBTA, which is enforced by the USFWS, makes it unlawful "by any means or manner, to pursue, hunt, take, capture [or] kill" any migratory bird except as permitted by regulation. The applicable regulations prohibit the take, possession, import, export, transport, sale purchase, barter, or the offering of these activities, except as permitted by the implementing regulations.

Marine Mammal Protection Act, 16 USC §§ 1361-1421h

The MMPA protects and conserves marine mammal species by placing a moratorium on harassing, hunting, capturing, or killing any marine mammal or attempting any of these. If a project proponent determines that

an action could incidentally harass ("take") marine mammals, the proponent must consult with either the USFWS or NMFS to determine if a permit to take a marine mammal is required. A recent redefinition of "take" of an MMPA-protected species occurred under the FY 2004 Defense Authorization Act (House Bill 1588), where an animal is "taken" if it is harassed, and where harassment is defined as "(i) any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild or (ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered" (section 315(f) P.L. 107–314; 16 USC § 703 note).

Rivers and Harbors Appropriations Act of 1899, 33 USC §§ 401, 403

Section 10 of the Federal Rivers and Harbors Appropriations Act of 1899 (RHA) prohibits the unauthorized obstruction or alteration of any navigable water. Navigable waters under the RHA are those "subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce" (33 CFR 3294). Typical activities requiring Section 10 permits are construction of piers, wharves, bulkheads, marinas, ramps, floats, intake structures, cable or pipeline crossings, and dredging and excavation.

Coastal Zone Management Act, 16 USC §§ 1451-1466

The CZMA encourages states to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources, such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife using those habitats. To encourage states to participate, the CZMA makes federal financial assistance available to any coastal state or territory that is willing to develop and implement a comprehensive coastal management program. Federal agencies are required to carry out activities that affect any land or water use or natural resource of a state's coastal zone in a manner consistent with the enforceable policies of an approved state management plan.

National Aquatic Nuisance Prevention and Control Act (NANCPA) of 1990

At the federal level, the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANCPA 90) mandated ballast water management for vessels entering the Great Lakes. This law was amended by the National Invasive Species Act of 1996 (NISA 96), which required the development of voluntary ballast management guidelines for all other ships entering US waters. The law also requires all vessels that enter US territorial waters (with certain exemptions) to manage ballast water according to prescribed measures. NISA 96 also required the US Coast Guard (USCG) to evaluate the effectiveness of the voluntary ballast management program three years after implementation. In 2004, voluntary guidelines were determined to be ineffective, so the USCG initiated mandatory ballast management for all ships entering US waters from outside the Exclusive Economic Zone (EEZ) of the United States.

Current management strategies for preventing the introduction of invasive species via ballast water are limited to ballast water retention, open ocean exchange, or alternate environmentally sound methods of ballast water management approved by the USCG.

Executive Order 11990

Executive Order 11990, Protection of Wetlands (42 FR 26961, May 24, 1977), was signed by President Carter in 1977 to avoid the adverse impacts associated with destroying or modifying wetlands.

Executive Order 13112

Enacted in 1999, this order directs federal agencies to prevent the introduction of invasive species and provide for their control, establishes the Invasive Species Council and directs them to write an invasive species management plan within 18 months.

National Invasive Species Act, P.L. 104-332

The federal National Invasive Species Act (1996) strengthened the 1990 law requiring open water exchange (OWE) of ballast water and mandatory ballast management plans and reporting.

Ocean Dumping Act, 33 USC, §§ 1401-1402

The USEPA has regulatory responsibilities with regard to ocean water quality under both the Clean Water Act (see above) and Title 1 of the Marine Protection, Research, and Sanctuaries Act (Ocean Dumping Act). The Ocean Dumping Act prohibits the unpermitted dumping of "any material transported from a location outside the United States" into the territorial sea of the United States, or into the zone contiguous to the territorial sea, to the extent discharge into the contiguous zone would affect the territorial sea or the territory of the United States. This act supersedes any related Clean Water Act requirements.

California Coastal Act, California Public Resources Code § 30000

The California Coastal Act (CCA) defines the "coastal zone" as the area of the state that extends three miles seaward and generally about 1,000 yards (910 meters) inland. In particularly important and generally undeveloped areas, where there can be considerable impact on the coastline from inland development, the coastal zone extends to a maximum of five miles (8 km) inland from mean high tide line. In developed urban areas, the coastal zone extends substantially less than 1,000 yards (910 meters) inland. The Coastal Commission's jurisdiction does not extend into or around San Francisco Bay, where development is regulated by the San Francisco Bay Conservation and Development Commission (Cal. Pub. Res. Code § 30103). Almost all development within the coastal zone, which contains many wetlands, requires a coastal development permit from either the Coastal Commission or a local government with a certified Local Coastal Program.

California Endangered Species Act, California Fish and Game Code §§ 2050-2111.5

The California Endangered Species Act (CESA) places the responsibility for maintaining a list of threatened and endangered species on the CDFG. The CDFG also maintains a list of candidate species that are under review for addition to either the list of endangered species or the list of threatened species. Pursuant to the requirements of CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any California-listed endangered or threatened species may be present in the project area and determine whether the proposed project will have a potentially significant impact on such species. In addition, the CDFG encourages informal consultation on any proposed project that may affect a candidate species.

Fish and Wildlife Protection and Conservation, California Fish and Game Code §§ 1600-1616

The state's authority in regulating activities in wetlands resides primarily with the CDFG and the State Water Resources Control Board (SWRCB). The State of California regulates wetlands through the CDFG, which provides comment on USACE permit actions under the Fish and Wildlife Coordination Act. The CDFG may develop mitigation measures and require the preparation of a streambed alteration agreement if a proposed project would obstruct the flow or alter the bed, channel, or bank of a river or stream in which there are fish

or wildlife resources, including intermittent and ephemeral streams. The CDFG is authorized to do so by the State Fish and Game Code Sections 1600-1616.

The California legislature and Fish and Game Commission have established state marine reserves, state marine conservation areas, and state marine parks in multiple, small ocean, and estuarine areas of the ROI. Additional marine protected areas are considered for establishment by the Commission as a result of the Marine Life Protection Act. The Commission has the authority to prohibit or restrict activities that may harm resources, including fishing, collecting, swimming, boating, and public entry. The CDFG works closely with the sanctuaries in oil spill response, damage assessment, and restoration through its Office of Spill Prevention and Response.

California Code of Regulations, Title 14 Division 1

The Fish and Game Commission has broad authority under this legislation and may establish regulations that restrict both sport and commercial fishing and otherwise afford protection to marine organisms and habitats.

California Marine Invasive Species Act, AB 433

The California Marine Invasive Species Act of 2003 mandates the management of ballast water. The act reauthorized and improved upon the California Ballast Water Management and Control Act (AB 703). It requires mid-ocean exchange or retention of ballast water for vessels coming from outside the EEZ and requires vessels coming from other west coast ports to minimize ballast water discharge. Record-keeping and other compliance measures apply to all vessels entering California waters.

State Water Resources Control Board

The SWRCB adopts statewide water quality control plans and policies, such as the Ocean Plan, the Thermal Plan, and the State Implementation Policy. The SWRCB has established a system of 34 Areas of Special Biological Significance (ASBS). These areas are designated for special protection from undesirable alteration in natural water quality. Five ASBSs are located in GFNMS, including Duxbury Reef, Point Reyes Headland, Double Point, Bird Rock, and the Farallon Islands (see Figure 3-1).

California Coastal Ecosystems Protection Act, SB 497

The California Coastal Ecosystems Protection Act of 2006 was designed to control invasive species in the ballast water discharged by ships. Performance standards for ballast water discharge proposed by the California State Lands Commission took effect with the passage of this law. These standards were to be fully complied with on or before January 1, 2008.

California Code of Regulations, Title 2, Division 3, Chapter 1, Article 4.6

Article 4.6 was designed to move the state toward elimination of the discharge of nonindigenous species into the waters of the state or into waters that may impact the waters of the state, based on the best available technology economically achievable. The provisions of Article 4.6 apply to all vessels arriving at a California port or place from another port or place within the Pacific Coast Region. All such vessels (1) shall exchange ballast water in near-coastal waters (more than 50 nm [93 km, 58 miles] from land and in water at least 200 meters [656 feet, 109 fathoms] deep) before entering the waters of the state if that ballast water was taken on in a port or place within the Pacific Coast Region, (2) shall retain all ballast water on board, (3) shall discharge the ballast water to a reception facility approved by the California State Lands Commission (CSLC), or (4) shall use an alternative, environmentally sound method of ballast water management that has been approved by the CSLC or the USCG.

3.3.5 Significance Criteria and Impact Methodology

Criteria to determine the significance of impacts on biological resources are based on federal, state, and local standards and regulations.

Impacts on biological resources in the ROI were evaluated by determining the sensitivity, significance, or rarity of each resource that would be affected by the proposed or alternative regulations and by using thresholds of significance to determine if the impact constitutes a significant impact. The significance threshold may be different for each habitat or species. Impacts may be either direct or indirect.

Direct impacts on biological resources result when biological resources or critical habitats are altered, destroyed, or removed during the course of project implementation. Indirect impacts on biological resources may occur when project-related activities result in environmental changes that indirectly influence the survival, distribution, or abundance of native species (or increase the abundance of ANS, i.e., nonnative species). Examples of indirect impacts include effects of noise, presence of chemical contamination, or incidence of human activity that may disturb or harm wildlife. It is also possible to have beneficial impacts, directly or indirectly. Finally, impacts may be short term or long term. Short-term impacts are generally not considered significant, by definition.

For this analysis, assessing specific potential impacts on biological resources is based on looking at the physical implications of each proposed and alternative regulation considered in relation to the known presence and extent of biological resources in the relevant areas. Parameters for assessment include the following:

- Relative importance or value of the resource affected (e.g., its legal, commercial, recreational, ecological, or scientific value);
- The resource's relevant occurrence in the region;
- Sensitivity of the resource to the Proposed Action;
- Anticipated physical extent of the potential impact; and
- Anticipated duration of the ecological ramifications of the potential impact.

Where relevant, the importance or value of each biological resource is evaluated based on the following criteria (listed in order of importance):

- Designation of the resource by federal or state resource agencies (e.g., USACE and the USFWS) as a high value or sensitive resource;
- Any known or presumed regional sensitivity of the resource; and
- Any known or presumed local significance of the resource.

In sum, for this analysis a project alternative was considered to have a significant impact on the biological environment under any of the following circumstances:

- If a population of a threatened, endangered, regulated, or other sensitive species was adversely affected by reduction in numbers, by alteration in behavior, reproduction, or survival, or by loss or

disturbance of habitat. Any "take" (see Section 3.3.10 under Wildlife Disturbance for definition) of a listed or sensitive species is considered significant under the ESA or the MMPA;

- If it conflicted with Coastal Zone Management Program policies;
- If it resulted in a jeopardy biological opinion by the USFWS or NOAA Fisheries;
- If it had a substantial adverse effect on a species, natural community, or habitat that is specifically recognized as biologically significant in local, state, or federal policies, statutes, or regulations;
- If it had a substantial adverse effect on a species, natural community, or habitat that is recognized for scientific, recreational, ecological, or commercial importance;
- If any fishes or wildlife migration routes were impeded for a period that would significantly disrupt that migration;
- If it would alter or destroy habitat in such a way that would prevent biological communities that inhabited the area prior to the project from reestablishing themselves;
- If it would extensively alter or cause the loss of biological communities in high-quality habitat for longer than one year; or
- If it allows biological resources to be exploited in ways inconsistent with the plans and policies of the NMS program or would otherwise violate the NMS or NOAA program regulations.

The overall methodology, including data sources and assumptions, used to conduct the biological resources impact evaluation is consistent with the NOAA NEPA guidelines (NAO 216-6). Impacts on biological resources from the implementation of the JMPR and revised regulations are entirely beneficial.

The actions associated with the cross-cutting regulations that are most likely to affect biological resources are vessel discharge restrictions (including cruise ship discharges) and introduced species prohibitions, both of which are expected to have beneficial impacts on the biological environment in all three sanctuaries.

At CBNMS, the regulatory changes that are most likely to affect biological resources are changes in ecosystem protections (altering the seabed and benthic communities) and wildlife disturbance. At GFNMS, the actions that are most likely to affect biological resources are changes in introduced species regulations, changes in discharges, wildlife disturbance, impacts from deserted vessels, changes to white shark attraction and approach actions, and seagrass bed protections especially in Tomales Bay. Finally, at MBNMS, the actions that are most likely to affect biological resources are changes in vessel spills from deserted vessels, the addition of the biologically significant area known as the Davidson Seamount, and reductions in disturbances to marine mammals, seabirds, sea turtles, and other fauna and flora as a result of changes to MPWC uses.

3.3.6 Cross-Cutting Regulations—Environmental Consequences

The cross-cutting regulations identified in Table 2-1 include identical or similar changes to the regulations in the three sanctuaries.

The Proposed Action

Introduced Species

Implementing regulations to reduce the number of introduced species entering the sanctuaries would have a direct beneficial impact on biological resources. There is currently no language in the sanctuary regulations that addresses introduced species, though both state and federal laws require that steps be taken to prevent the introduction of nonnative species in US waters (see Section 3.3.4, Regulatory Environment). The proposed management measures would prohibit the release of introduced species into the three sanctuaries.

Introduced species (ANS) alter habitat, prey on native species, compete for resources, and carry diseases, all of which decrease the success of native species. This is particularly true in nearshore or brackish (estuarine) environments where resources are more concentrated than they are in open ocean environments. Any action that reduces or prevents the introduction or prevalence of ANS is expected to provide an overall beneficial impact on the native flora and fauna.

Introduced species have been shown in many cases to change species composition, to threaten the abundance and diversity of native marine species (especially threatened and endangered species), and to interfere with an ecosystem's overall healthy functioning. Introduced species may cause local native species to become extinct, either by preying on them directly or by out-competing them for prey or habitat area, or introduced species may cause changes in physical habitat structure. Natural biological communities and ecological processes in the sanctuaries, and any threatened or endangered species within the area, are at risk.

Discharge of ballast water from ocean-going vessels is a common source of introduced species. Large commercial ships pump water into their ballast tanks to make them more stable during ocean voyages. This water may contain pathogens, viruses and the larvae, ova or species of plants, invertebrates and fish from the "home port" or adjacent sea. Once the ship arrives at a new port, it may discharge its ballast water, including any invasive species, at sea prior to entering a port or harbor. Some species will not be able to survive the new conditions, but others may thrive if they can live in the new conditions, avoid predators, and out-compete native species. Other vessel pathways of introduced species may include hull fouling, anchor transport, sea chests, and any other means by which water or species may be transported or attached to a vessel. There are many other non-vessel pathways in which nonnative species may be introduced, purposefully or accidentally, into a new environment including: the transport of organisms or use or organisms for research, restoration, educational activities, aquarium activities, live bait, aquaculture, biological control, live seafood, fish processing, and even rehabilitated and released animals may also be vectors for introduced species in the sanctuaries. Even home aquarium activities, particularly when people deliberately release organisms into the wild, have been documented to cause invasive species introductions. Often live seafood itself (e.g., lobster, tilapia, crabs) and the materials in which some live seafood is shipped (e.g., seawater, moist algae) can cause problems if they are allowed to escape confinement or are disposed of improperly (USFWS 2004).

A potentially significant threat to native biological resources is the creation of genetically modified species, which, depending on the species and genetic makeup, could mate with native species and dilute or alter their genetic makeup. This can weaken the native genetic stock and eventually create a new subspecies that may be able to outcompete the native species. The proposed regulation would prohibit the introduction of genetically modified species and would help to reduce or eliminate such threats.

The three sanctuaries are all currently at risk from introduced species. Introduced species prohibitions specifically will help in some of the following areas: anywhere where kelp beds may be replaced by invasives (such as the seaweed *Undaria*), where wetland areas are eroded by burrowing species, and where large populations of mitten crabs *(Eriocheir sinensis)* affect food webs through their omnivorous and opportunistic feeding habitats.

As a result of the proposed regulation prohibiting introduced species in the sanctuaries (except striped bass released during catch and release activities and (for GFNMS only) species cultivated by mariculture activities in Tomales Bay pursuant to a valid lease, permit, license or other authorization issued by the State of California and in effect on the effective date of the final regulation), there would be beneficial impacts on biological resources, including maintaining the natural habitats, species diversity, and ecosystem balance in the sanctuaries. Additional beneficial effects would include disease prevention and maintenance of native species genetic makeup.

Discharge Regulation Clarifications

There are several proposed regulatory modifications that would limit general vessel discharges within the sanctuaries. Amending the language of sanctuary discharge regulations so that discharge prohibitions are clearer and more consistent in sanctuary waters is likely to have an overall direct beneficial impact on biological resources in the sanctuaries. New regulatory language may decrease the likelihood of potentially harmful discharges, such as wastes associated with meals on board vessels (for example, food, plastics, and trash), from entering sanctuary waters and causing injury or death to living sanctuary resources. In addition to improvements in inshore and offshore marine habitats, pollutants and discharge changes may help improve water quality in inlets and bays. Pollutants and discharge in these habitats can have a significant localized negative impact on the environment, including increasing nitrogen and phosphorus concentrations in the water that can lead to algae blooms and reduce oxygen levels. Although the State of California regulates this activity in state waters, there is a need for a consistent regulation that applies to both federal and state waters in all three sanctuaries. The Proposed Action would amend and clarify the exceptions for existing discharge regulations, such as making it clear that discharging oily waste from bilges and ballast water is prohibited.

With the high level of diverse biological communities found in the sanctuaries, there is a high potential for impacts from discharges. As discussed earlier, the variety and size of habitats support a high diversity and abundance of species, including fish, seabirds and marine mammals, many of which are federally listed as endangered or threatened. Harmful discharges have the potential to impact sensitive species, degrade a variety of coastal and marine habitats, and potentially change the fragile ecological predator-prey relationships that evolved under clean water scenarios. Some of the species that could be impacted from spills that degrade habitat include blue and humpback whales, Marbled Murrelets, Ashy and Leach's Storm Petrels, Brandt's, Pelagic, and Double-crested Cormorants, Western Gulls, Common Murres, Pigeon Guillemots, Cassin's and Rhinoceros Auklets, Black Oystercatchers, coho and chinook salmon, and other lesser known species, such as tidewater goby and Short-tail Albatross.

The new regulations under the Proposed Action would provide greater protections to the sanctuaries' waters from vessel pollution and all associated impacts and would thus have direct beneficial impacts on biological resources. There would also be indirect impacts as a result of better water quality, which would in turn create better habitat and improve conditions for biological resources. In addition, this would benefit fish populations and other species that rely on fish for prey.

Other Discharges

Examples of other types of discharge releases discussed in the Proposed Action are discharges from MSDs or graywater. Large vessels would no longer be allowed to discharge sewage and, in MBNMS, graywater if they have sufficient holding tank capacity to hold their waste while in the Sanctuary. The primary purpose of regulating large-vessel discharges/deposits is to prevent adverse effects on biological resources as a result of potential pollutant discharges/deposits. Depending on what chemicals and pathogens are in these wastes, they can impair living resources and even cause death if the concentrations are sustained at high levels over a period of time. The impacts of changing these regulations would be beneficial because the regulations would become consistent with state law and uniform across the three sites. These regulations are intended to ultimately improve water quality and the health of marine biological organisms, which would be a beneficial biological effect.

For vessels under 300 gross tons, the Proposed Action requires use of Type I or Type II MSD, in order to discharge treated sewage, operated in a manner that prevents discharge of untreated sewage. The Proposed Action also requires that deck washdown be clean, i.e., free from harmful matter (as defined in the regulations), clarifies that ballast water and oil wastes from bilge pumping are prohibited, and prohibits discarding food overboard. NOAA proposes to clarify its regulations that already require the use of Type I or II MSD devices for any treated sewage discharge throughout the sanctuaries' waters. The clarification would make it understood that use of a Type III MSD (a holding tank of untreated sewage) is allowed but that a discharge from a Type III MSD would be prohibited in the sanctuaries. Additionally, the proposed regulation requires that the boat users lock (secure) the valves on such systems to prevent users from bypassing the storage of sewage and directly discharging the untreated sewage. This regulation is meant to facilitate enforcement by the Coast Guard to prevent accidental discharge and reduce the discharge of raw sewage into sanctuary waters. For a more in-depth discussion of these issues, please see Sections 3.5 and 3.6. MSD regulations address the discharge of raw sewage, which has a specific harmful biological impact.

The clarification of the existing regulations may increase compliance and enforceability and reduce unintentional violations relating to the use of MSDs in the sanctuaries. This is expected to result in a decrease in the discharge of raw sewage from vessels, which in turn is expected to benefit water quality by reducing fecal coliform bacteria and other associated viruses and pathogens in the marine environment. Since the Proposed Action has the potential to reduce the quantity of sewage discharge into the sanctuaries, it would have potential significant beneficial future impacts on biological resources, as a result of improved water quality and associated habitat benefits.

Ballast and bilge discharges are also pathways to introduce toxins and oil into the marine environment. Oil and other toxins are detrimental to most marine species, particularly birds and marine mammals. Birds and marine mammals are vulnerable because oily substances also interfere with their ability to thermoregulate. Such oily and hazardous waste discharges can have direct significant adverse impacts (e.g., death or illness) on individual wildlife or they can have indirect impacts from long-term habitat degradation and reductions in prey availability. Thus, any proposed measures that create a stricter regulatory environment with regard to discharges and that prevent marine vessels from discharging unallowable pollutants would directly improve habitat and water quality and would benefit biological resources by improving ecosystem conditions within the sanctuaries.

It should be noted that chumming will still be allowed, but a slight modification to the regulatory language would be made to clarify that chumming is limited to "lawful fishing activity." Fish, fish parts, or chumming

materials (bait) used in or resulting from lawful fishing activity within the Sanctuary and discharged or deposited while conducting lawful fishing would continue. This slight modification would not result in any impacts, as the sanctuaries are amending the regulatory language for purposes of clarification.

Cruise Ship Discharges

There is a new regulation that prohibits cruise ship discharges throughout all three sanctuaries. Proposed regulatory changes clarify what is prohibited or exempt in the different sanctuaries for both general ballast discharge and cruise ship discharge, the latter of which was not previously distinguished from other regulated vessel discharges in Sanctuary regulations. The proposed regulations would limit cruise ship discharges in the sanctuaries. Cruise ship regulations also address the discharge of raw sewage, which has a specific and harmful biological impact. Regulations would limit discharges to clean vessel engine cooling water, generator cooling water, and anchor wash to reflect that cruise ships may anchor overnight in Monterey Bay. Cruise ships only transit CBNMS and GFNMS to and from the port of San Francisco.

Cruise ships in the sanctuaries would no longer be permitted to discharge biodegradable effluents, deck wash, treated wastewater, or any other materials other than vessel engine cooling water, generator cooling water and anchor wash into the sanctuaries. This regulation would greatly reduce potential impacts from cruise ships on sanctuary resources, including impacts resulting from sewage, graywater, oily bilge water, and ballast water. Depending upon what chemicals, hazardous wastes, and pathogens are in these wastes, they can impair living resources and even cause death if the concentrations are sustained at high levels over a period of time.

The purpose of regulating cruise ship discharges is to minimize adverse effects on biological resources as a result of potential pollutant discharges. The main concern associated with cruise ships is the large volume of discharge. A wide array of pollutants (e.g., sewage, graywater, oily bilge water, hazardous waste, and solid wastes) may be discharged in large volumes from cruise ships due to their sheer size, passenger capacity, and environmental practices (see Section 3.5, Water Quality, for more details on cruise ship discharge volumes). These changes would affect how current activities within the sanctuaries are conducted and are expected to decrease the likelihood that marine vessels would discharge potentially harmful pollutants. Discharge impacts are also linked to those potential impacts discussed above under Introduced Species, since a major vector for the release of introduced species is through ballast discharge. Improving discharge protections would improve water quality and would have a beneficial impact on biological resources.

All of the sanctuaries already have some regulations in place regarding discharges, but these regulations are not consistent across the three areas. The cross-cutting impacts of changing these regulations would be beneficial, as the regulations would become more consistent and comprehensive across the three sites. These regulations are intended to ultimately improve water quality and the health of marine biological organisms, which would be a beneficial biological effect.

Alternative Regulatory Actions

There is one cross-cutting alternative, which addresses cruise ship discharges.

Cruise Ship Prohibition Alternative

This alternative provision would result in cruise ships being allowed to discharge wastewater that has been properly treated to a level not to exceed the standards set forth by the US Coast Guard in Alaska at 33 CFR 159, Subpart E (see discussion about cruise ship wastewater discharges in Section 3.5, Water Quality). Because the wastewater would be treated to reduce nutrients (nitrogen and phosphorus) and reduce or

eliminate the toxicity or hazardous properties of the wastes, the overall water quality would be improved and therefore have beneficial impacts on biological resources. Although the discharged wastewater would be treated, there is still the potential for the discharges to contain harmful effluent (i.e., oily wastes, toxic chemicals, nutrients, pathogens, viruses) which can impair, injure or even cause death to living resources. As discussed in Section 3.5.4, some MSDs do not achieve the effluent standards they are designed to meet. Therefore, the beneficial nature of the impact would be slightly less than under the Proposed Action because no discharge (treated or untreated) would be allowed under the Proposed Action.

The No Action Alternative

The No Action alternative would be to continue to manage the sanctuaries as they are currently managed; the additional protections from introduced species and vessel discharges identified above would not be implemented. This would maintain the current inconsistencies between the sanctuaries with respect to discharge regulations and their exceptions.

Under No Action, the sanctuaries would be without the new regulatory changes to address threats from introduced species, cruise ship discharges (sewage, toxic and hazardous wastes) and other oily and toxic discharges from ballast water. However, all existing agencies would continue to regulate certain aspects of water quality. As discussed in Section 3.5.4, Water Quality, the No Action alternative would result in an ongoing less than significant adverse impact on water quality. This in turn could lead to direct and indirect adverse impacts on biological resources from the reduction in the overall health and successful propagation of biological resources (resulting in lower diversity), and a reduced overall state of health of the sanctuaries' ecosystems. Overall, some less than significant adverse impacts could be expected on biological resources under the No Action alternative.

3.3.7 Cordell Bank National Marine Sanctuary—Environmental Consequences

The Proposed Action

Seabed Protection

The proposed regulation would prohibit drilling, dredging, or altering, constructing, placing, or abandoning any structure, material or matter on the submerged lands within the line representing the 50-fathom isobath surrounding Cordell Bank. Additionally, the regulation would prohibit the same activities listed above in the remainder of the sanctuary outside the 50-fathom isobath, with the exception of anchoring. The proposed regulation would result in enhanced protections for habitat and species by reducing or eliminating physical impacts and associated habitat loss and would result in positive impacts on biological resources at all trophic levels (i.e., within all categories of organisms, including fish, invertebrates, seabirds, and marine mammals).

Implementing and clarifying regulations that address seabed protection within the Sanctuary would have a beneficial impact on biological resources, whether the protection is from preventing any type of future drilling (no drilling currently takes place or is proposed) or from reducing activities (such as placing structures or dredging) that could physically disturb, harm, or injure benthic communities. The prohibitions would safeguard the fragile high relief on the Bank, particularly the pinnacles and ridges, from the threat of permanent destruction. The relief and benthic cover on the Bank provide food and shelter for many species of fish. The proposed regulatory change would clearly eliminate or at least reduce the likelihood of detrimental activities from affecting the seafloor, particularly on Cordell Bank.

Stricter regulations prohibiting construction, drilling, and dredging inside the Sanctuary would preserve habitats and as such predator-prey relationships that have established along with undisturbed habitats. This prohibition would beneficially affect biological resources by directly minimizing physical disturbance to the species and their habitat. The prohibition would also provide indirect beneficial impacts on biological resources by reducing sediment-related disturbances. The proposed seafloor protection regulations would increase protection of the benthic environment and actually enhance the long-term health of the benthos and its associated fishes and invertebrate communities, which affect those species that depend on these resources (such as seabirds, marine mammals, and humans). This provision would result in beneficial impacts on biological resources.

Benthic Habitat Protection

There is an existing benthic habitat regulation that prohibits the removal, taking, or injuring benthic invertebrates or algae on or within the 50-fathom isobath surrounding Cordell Bank, except for "accidental removal, injury, or takings during normal fishing operations." The prohibition is being revised and clarified to be consistent with the above seabed protection measure. As stated in the text of the proposed regulatory language, this prohibition would not apply to bottom contact gear used during fishing, which is prohibited under 50 CFR part 660 (fisheries off west coast states and in the western Pacific). The revision will have the same amount of protection as the existing regulation and would result in no adverse impacts on biological resources.

Wildlife Disturbance

Currently, there is no regulatory language regarding wildlife disturbance in CBMNS, though there are some federal regulations that address certain aspects of wildlife disturbance and harassment. The new regulation being proposed for CBNMS prohibits the taking (harassment) of protected wildlife (and is also being proposed for GFNMS) and would enhance existing protections and provide this Sanctuary with regulations consistent with MBNMS (and GFNMS). Implementing regulations in CBNMS relevant to controlling disturbance of marine mammals, sea turtles, and birds would have a beneficial impact on biological resources by reducing the impacts of human disturbance on their feeding, reproductive and resting activities. Numerous seabird and marine mammal species, as mentioned above, occur in CBNMS, and these added protections would be highly beneficial to these species. Regulations will improve the enforcement and outreach of existing protections for seabirds on and above the water, as well as for seals that are in the water. While, as a rule, this regulation applies to resources taken in or above the Sanctuary and not beyond the boundary, if a protected species were harassed or disturbed and then entered Sanctuary waters as a result of disturbance, then prohibitions from these regulations would apply.

Wildlife is federally protected under the MMPA, ESA, and the MBTA, plus any regulations promulgated thereunder. These acts regulate taking, harassing, or possessing any marine mammal (ESA and MMPA), any listed sea turtle (ESA), or any migratory bird species (MBTA). Taking under the ESA is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, collecting, or injuring, or attempting to engage in any such conduct. Under the MBTA, it is unlawful at any time, by any means, or in any manner to pursue, hunt, take, capture, kill, or attempt to take, capture, or kill any migratory bird (it does not restrict application to deliberate types of killing normally associated with poaching or hunting). Under the previous version of the MMPA, harassment was defined as "any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild" (Level A Harassment) or "has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering" (Level B

Harassment). Under the MMPA, as amended by the Fiscal Year 2004 Defense Authorization Act (Public Law [P.L.] No: 108-136), Level A Harassment is now changed so that "potential to injure" is modified to "probability of injuring," and Level B Harassment is defined as "has the potential to disturb a marine mammal or marine mammal stock in the wild by causing meaningful disruption of biologically significant activities, including, but not limited to, migration, breeding, care of young, predator avoidance or defense, and feeding."

Language would be added to CBNMS regulations that prohibits the taking of any marine mammal, sea turtle, or bird in or above the Sanctuary, with certain exceptions or as permitted by federal regulations (the MMPA, ESA, and the MBTA). The change would also prohibit possessing any marine mammal, sea turtle, or bird taken within the Sanctuary, except as authorized under the MMPA, ESA, or the MBTA. For the purpose of the sanctuaries, the definition of take includes any of the following activities: collecting any dead or injured sea turtle, marine mammal, or bird, or any part thereof; restraining or detaining any sea turtle, marine mammal, or bird, or any part thereof, no matter how temporarily; tagging any sea turtle, marine mammal, or bird; or operating a vessel or aircraft or engaging in any other act that disturbs or molests any sea turtle, marine mammal, or bird.

This prohibition would complement the MMPA, ESA, and MBTA by extending protection for Sanctuary resources across all three sanctuaries in federal and state waters and providing a greater deterrent with civil penalties up to $130,000 per taking, enforceable under the NMSA. This comprehensive prohibition covers all marine mammals, sea turtles, and birds in and above the Sanctuary.

Adding this language to CBNMS regulations would benefit biological resources by reducing the likelihood of human disturbance and injury to marine mammals, birds and sea turtles, and by allowing them to engage in uninterrupted breeding, nursing, resting activities. Beneficial effects are expected for marine mammals, sea turtles, and birds due to the greater deterrence provided by the regulation and the civil penalty, which makes it less likely those individuals would violate the prohibition.

Alternative Regulatory Actions

The alternatives would have the same impacts as identified in the Proposed Action, with the differences detailed below.

Seabed Protection Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within a line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action. Under this alternative, NOAA would issue regulations under the authority of the NMSA prohibiting bottom-contact fishing gear within the 50-fathom isobath surrounding the Bank. Lawful use of fishing gear other than bottom-contact gear would be exempt from the regulation. This regulation would result in beneficial impacts on biological resources because in addition to prohibiting drilling, dredging, or altering, constructing, placing, or abandoning any structure material or matter on the submerged lands it would prohibit the use of bottom-contact fishing gear, which can snag, entangle, break-off, injure and remove fragile bottom habitats on Cordell Bank. This regulatory alternative would have greater beneficial impacts for biological resources than described for the Proposed Action since it would regulate impacts on biological resources resulting from the use of bottom contact fishing gear on Cordell Bank. However, the beneficial impacts would be the same as the Proposed Action if the NOAA Fisheries regulations that prohibit bottom contact gear on Cordell Bank are considered.

Benthic Habitat Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within the line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action. Under this alternative, in addition to the minor corrections and clarifications, NOAA would issue regulations under the authority of the NMSA prohibiting bottom-contact fishing gear within the 50-fathom isobath around the Bank. In addition, a new definition of bottom-contact fishing gear would be included in the sanctuary regulations. This regulatory alternative would have greater beneficial impacts for biological resources than described for the Proposed Action since it would regulate impacts on biological resources resulting from the use of bottom-contact fishing gear on Cordell Bank. However, the beneficial impacts would be the same as the Proposed Action if the NOAA Fisheries regulations that prohibit bottom contact gear on Cordell Bank are considered.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. Without the proposed wildlife disturbance regulation or limitations on dredging, drilling, or other activities that could disturb the seabed or benthic resources, less protection would be provided in the future for Sanctuary biological resources as compared to the Proposed Action.

3.3.8 Gulf of the Farallones National Marine Sanctuary—Environmental Consequences

The Proposed Action

Water Quality – Discharges From Outside the Sanctuary

GFNMS is proposing a prohibition on discharges from outside the Sanctuary that enter and injure Sanctuary resources. This prohibition provides a mechanism for the Sanctuary to address potentially harmful sources of pollution such as gas, oil, sewage, and other hazardous and toxic wastes that originate outside the Sanctuary, but could enter and injure Sanctuary resources. Potential upland sources of pollution include municipal wastewater outfalls, industrial outfalls, surface runoff (nonpoint source pollution), and oil and hazardous materials spills. Some examples of marine based sources of pollution include discharges from transiting vessels and wrecked ships, and underwater pipelines. This regulation would have direct beneficial impacts on biological resources, by minimizing or reducing the likelihood of potentially harmful or toxic spills or discharges that could kill, injure or impair birds, marine mammals, sea turtles, fish and other Sanctuary resources.

Deserted Vessels

Prohibiting marine vessel owners from deserting vessels and from leaving harmful materials on deserted vessels is expected to have direct and indirect beneficial impacts on biological resources. When a vessel is deserted, the likelihood of a vessel going aground increases, as does the risk of sinking or spilling its contents, including fuel, oil, or any other harmful materials left on board (such as fishing gear, nets, cargo, etc.). These events could result in discharge of harmful toxins, chemicals, or oils into the marine environment, any of which would reduce the quality of the habitat both directly (through introduction of noxious materials) and indirectly (through reduction in available prey or other resources). The proposed requirement would provide greater protection of habitats, the ecosystem, and a wide range of organisms in the Sanctuary, because the possibility of incurring a NMSA civil penalty would be an incentive for owners to remove the vessel before it breaks apart, sinks, or spills its contents. This would help reduce the risk of discharges of harmful matter into surrounding waters. Therefore, the Proposed Action would have direct and indirect benefits on biological

resources. Preventing vessel owners from allowing their vessels to become threats to the marine environment prevents harm to biological resources.

White Shark Attraction and Approaching

There are no specific GFNMS regulations that address approaching or attracting white sharks (i.e., trying to bring the animals closer to adventure charters or to pleasure/recreational vessels). The proposed regulation would define "attracting," which is an important step to clarifying which actions are legal or illegal in relation to interacting with the sharks. The proposed regulation would prohibit all white shark attraction activities within the Sanctuary and prohibit approaching within 50 meters (164 feet) of any sharks within 2 nm (2.3 miles; 3.7 km) of the Farallon Islands. This would greatly increase the protection of the white sharks known to make an annual migration to the Farallon Islands to feed and would prevent disturbances and/or alterations in their natural behaviors, including feeding, breeding, aggregating, and migrating. Elsewhere in GFNMS (outside of the 2 nm [2.3 miles, 3.7 km] radius around the Farallon Islands), the prohibition regarding "approaching" would not apply.

This regulation is expected to have a beneficial impact on this species since it would curtail existing attraction activities that may interfere or disrupt undisturbed shark behavior patterns, such as breeding, feeding, resting and socializing. This regulation would also reduce conflicts between shark researchers and shark wildlife viewing operators. Multiple pleasure boats and ecotour operators travel to the southeast Farallon Islands mainly from September through November to give paying participants a chance to view these animals. Some deploy surfboards to elicit strike/attack responses from the resident and potentially sensitive populations of white sharks located between Mirounga Bay and Fisherman's Cove at the southeast Farallon Islands (Absolute Adventures 2003). Some of these groups engage in chumming with fish parts or oil (Absolute Adventures 2003).

To date, human harassment and disturbance of white sharks has resulted mainly from dive-with-shark programs and scientific researchers studying the sharks. Scientific researchers have long been studying white sharks off the Farallon Islands. When researchers need to get close to a shark to sample its blood or attach an instrument, they will use fish bait, chum, blood or even towed surfboards to attract sharks. While this activity certainly changes the behavior of the sharks, the knowledge that scientists gain significantly contributes to our understanding of white sharks and their role in the ecosystem at the Farallon Islands. Dive-with-shark operators use similar methods to attract sharks to provide their customers with a guaranteed "encounter" with a white shark. Ultimately, attracting white sharks alters their natural behavior and may distract them from conducting other activities, such as feeding or breeding.

Regulating attracting activities is especially important to the shark's critical feeding behaviors, as interrupting the foraging of an individual can cause a series of problems related to their success both in terms of survival and reproduction. Indirectly, other human impacts associated with close proximity, such as sound, light, and humans in the water, may also alter a shark's behavior. Implementing these regulations will help resolve user conflicts (such as current controversies involving shark researcher studies versus encounters related to adventure tourism) and will prevent intervention with the feeding behavior of white sharks. The additional protections for white sharks provided by the shark attraction and approach regulation will have a direct beneficial impact on this species and may have indirect beneficial impacts on other biological resources in which the white shark plays a key predator role by maintaining the health of the overall ecosystem. Further beneficial impacts are expected from the 50-meter (164-feet) approach prohibition around the Farallon Islands, where white sharks are known to occur with seasonal frequency. By not attracting a top food chain

predator, the possibility of sharks habituating to human activities would be reduced or eliminated. For reasons described above, reducing human interaction and preventing chumming would increase the likelihood that a shark would go about its natural feeding and daily activities and would prevent any unnatural dependency on a commercial recreational situation. This would result in a beneficial impact on biological resources.

Wildlife Disturbance

The proposed wildlife disturbance regulatory language for GFNMS is the same as that described above for CBNMS. As with CBNMS, there is no regulatory language regarding wildlife disturbance in GFNMS, though there are federal regulations that address wildlife disturbance. Implementing regulations in GFNMS relevant to controlling disturbance of wildlife (marine mammals, sea turtles, and birds) would have a beneficial impact on biological resources. GFNMS provides indispensable valuable habitat for many biological resources, especially seabirds and marine mammals. GFNMS is a significant area for many protected species, providing foraging, breeding, and other habitat for aquatic and migratory birds. There are also thirty-six species of marine mammals, including pinnipeds, whales, dolphins, porpoises, and otters. Adding this language to GFNMS regulations would benefit biological resources due to the greater protections provided by the regulation for marine mammals, sea turtles, and birds.

Oil and Gas Pipeline Clarification

The proposed regulation would modify the existing oil and gas regulation by limiting pipelines going through the Sanctuary to those associated with hydrocarbon operations outside but directly adjacent to the Sanctuary. The clarification does not limit exploration outside the Sanctuary, however, it does limit oil and gas pipelines within the Sanctuary to only those where there is an adjacent oil and gas development site and there is a geographic requirement to cross the Sanctuary. This regulation would have direct minor beneficial impacts on biological resources. While no such oil and gas pipelines exist in GFNMS—in fact a moratorium is in place on oil and gas development in federal waters outside the Sanctuary, as well as within the Sanctuary—this regulation would eliminate the potential for new oil and gas pipelines crossing the Sanctuary unless there is a hydrocarbon operation on a lease adjacent to the sanctuary. Reducing the potential for pipelines to cross the Sanctuary would reduce impacts on benthic habitats from the physical damage caused by installing the pipe and would reduce the risk of potential oil spills from a pipeline leak or rupture. This reduced risk of oil spills would be beneficial for all marine and coastal biological resources.

No-Anchoring Seagrass Protection Zones

Prohibiting vessels from anchoring in designated seagrass protection zones would result in both direct and indirect beneficial impacts on biological resources. As stated in the affected environment, seagrasses provide valuable habitat and support high biodiversity. Seagrasses are particularly important in the sustainability of commercial and recreational fisheries, primarily because of their roles in maintaining sediment stability and water quality and in providing shelter and food critical to the survival of a variety of aquatic biota. In order to understand the beneficial effects, background information on the importance and function of seagrass in the study area is presented below.

Seagrasses are limited to the photic zone and are usually attached to soft substratum. Seagrasses are commonly found in tidal and upper subtidal zones and are located throughout the GFNMS in estuaries, bays and lagoons, such as Tomales Bay and Bolinas Lagoon. Tomales Bay is one of the most ecologically significant estuarine areas in California. The bay provides critical habitat for numerous species listed under the Endangered Species Act and the Marine Mammal Protection Act. Seagrass and red algae (*Gracilaria* spp.)

cover approximately four square kilometers (1.5 square miles), or 13 percent of Tomales Bay. Other habitats found here include intertidal mudflats, subtidal channels, salt marsh, and upland marsh.

The seagrass species found in Tomales Bay is *Zostera marina*, commonly called eelgrass. It provides important habitat for bay pipefish, shiner perch, arrow goby, northern anchovy, California halibut, Pacific staghorn sculpin, coho salmon, steelhead trout, Pacific herring, and other fish in Tomales Bay. It has been designated as an Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation Management Act. There are ten to 100 times more animals in eelgrass beds compared to adjacent sandy or muddy habitats (Hemming and Duarte 2000). Food for fish, including plants, algae, invertebrate species, detritus, is abundant. Seagrasses also produce a large amount of organic material, which enters the estuarine food chain. Eelgrass provides protection from predation by bigger fish and birds. Some species of fish use eelgrass beds for their spawning grounds, including the commercially important Pacific herring, which relies on abundant eelgrass beds to support its roe. Eelgrass beds also serve as a nursery ground, providing a safer place for larvae and juvenile fish to feed and grow (Heck et al 1989).

Eelgrass beds help to support a huge population of birds. About 20,000 shorebirds and 25,000 waterfowl use the eelgrass beds and adjacent areas in Tomales Bay for their feeding ground. Some of these bird species include Black Brandts, Black Scoter, Greater Scaup, Great Blue Heron, Black Brant, Marbled Godwit, Western Sandpiper, Dunlin, and Willet. They feed on eelgrass, fishes, and invertebrates. Tomales Bay eelgrass beds provide migratory feeding and resting stops for Black Brant that travel between the Arctic tundra of Alaska, Russia and Canada in a 3000 mile range over the Pacific Ocean to wintering grounds in the estuaries and lagoons of Southern British Columbia, the United States and Mexico (Derksen et al 1998).

In addition to supporting fish and birds, eelgrass sustains other species that rely on detritus, algae and other food resources available in eelgrass beds. Invertebrate species such as clams, shrimp, snails, nudibranchs, amphipods, worms, and bryozoans consume tiny algae that grow on eelgrass blades, and filter detritus and phytoplankton from the water. In turn, these animals provide food for many other animals that live and/or feed in eelgrass beds. Approximately 20 species of commercially valuable species feed in eelgrass beds at some point in their lives, including Dungeness crabs, rockfish, salmon and Pacific herring (Sea Grant Fact Sheet).

Eelgrass provides many ecosystem services beyond providing habitat and food for animals. It improves water quality along the coast by trapping sediments and nutrients. An acre of healthy seagrass can absorb approximately six pounds of nutrients per year, the equivalent of treated effluent from 490 people. With less nutrients available in the water column, phytoplankton are less likely to multiply rapidly, thereby reducing algal blooms that can degrade water quality. Eelgrass helps to prevent shoreline erosion by reducing the impacts of wave energy and storms. Eelgrass also sequesters carbon; one acre of eelgrass sequesters 7,401 pounds of carbon per year, which equals the CO2 emissions from an automobile that has traveled 3,860 miles (Duarte et al 2005).

Although healthy eelgrass can provide many ecosystem services, it is not immune to the increasing pressure from human activities. Because it needs sunlight to survive, eelgrass only occurs in shallow waters along the coast, and water clarity is essential for its survival. Unfortunately, coastal areas are subjected to increasing sediment and nutrient runoff from fertilized lawns and farms, sewage, and land development, as well as physical disturbances (dredging and damage from boating activities), invasive species, disease, and algal blooms (Orth et al 2006). In the 1930s, over 90 percent of the North Atlantic eelgrass meadows died off

when a combination of abnormally warm ocean currents and a fungal disease hit the coast. The death of the eelgrass led to the disappearance of many species of ducks and geese, and the stocks of crabs, clams, scallops, and lobsters severely declined. In addition, coastal erosion became a problem (Rasmussen 1977). This event demonstrated the importance of eelgrass for healthy marine ecosystems.

Studies in other parts of the world have found that vessel propellers, anchors and moorings can damage the underground root and rhizome system of eelgrass, which can have long-term impacts on the health of the eelgrass community (Milazzo, M., et al, 2002; Walker et al., 1989; Kentworthy et al, 2006). Anchoring can damage seagrass beds by interfering with the reproductive system (the Rhizome system). As vessels swing on their anchors, drag them in strong winds, or pull up their anchors, they can plow up seagrass beds, dislodging their stems and killing the plants. Recovery rates from vessel-related damage are not well-documented for seagrass. There have been efforts underway to restore several different species of seagrass in the Chesapeake Bay for several years with very poor results; less than 10 percent of the transplant sites have had long-term survival. A recent effort to restore eelgrass beds in San Francisco Bay has had little to no success, most likely due to deteriorating conditions in the Bay.

The shrinking of seagrass habitat worldwide poses a particular threat to many vulnerable species. Substantial losses of seagrass have occurred as a result of direct and indirect human impacts including mechanical damage (by dredging, fishing, and anchoring), eutrophication, conversion to aquaculture, siltation, effects of coastal construction, and food web alterations; and indirect human impacts, including negative effects of climate change (erosion by rising sea level), as well as from natural causes, such as storms and floods. Quantifying the effects from one specific activity is extremely difficult, as it is impossible to isolate individual effects.

Both recreational vessels (sailboats, pleasure boats, recreational fishing boats) and commercial vessels (commercial fishing or vessels used in mariculture operations) regularly anchor throughout Tomales Bay. Vessel anchors cast into seagrass beds can damage individual seagrass plants and disturb the substrate onto which the seagrass grows. Pulling an anchor can also suspend sediments in the water column, which reduces the amount of light available to the plants and may interfere with filter feeding organisms. By prohibiting vessel anchoring in designated zones in Tomales Bay, the seagrass in these areas would be protected from the physical disturbance caused by the vessel's anchor or dragging the anchor on the bottom. It would also help prevent sediments from being suspended into the water column. By maintaining healthy seagrass areas, this valuable habitat and the sensitive species it supports would be benefited as well.

This beneficial effect would occur only in the designated zones in Tomales Bay and not other areas of the Sanctuary, such as Bolinas Lagoon where seagrass may also be present. Although the seven zones encompass most of the seagrass beds in Tomales Bay, there are some small areas located near marinas and day-use recreational areas that were not included in the no-anchoring zone since they are high use areas and displacement of vessels near these areas is not practicable.

Alternative Regulatory Actions

The alternatives would have the same impacts as those identified in the Proposed Action, with the differences detailed below.

White Shark Approach Prohibition Alternative

This alternative would prohibit both attraction and approach activities throughout the Sanctuary, rather than allowing approaching outside 2 nm (2.3 miles; 3.7 km) of the Farallon Islands, as proposed. Therefore, this alternative is more restrictive than the Proposed Action. This would provide an even greater level of protection to the species, with beneficial effects on white sharks and an indirect benefit to other species that may also experience disturbance from humans.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would mean that the additional protections provided by the proposed regulations described above would not be implemented. At GFNMS, this would translate into continued disturbance of white sharks in the Sanctuary and lower levels of resource protection, compared to the Proposed Action.

3.3.9 Monterey Bay National Marine Sanctuary—Environmental Consequences

The Proposed Action

Deserted Vessels

MBNMS is proposing regulations to prohibit marine vessel owners from deserting vessels. This regulation is the same as the GFNMS proposal regarding deserted vessels and removing harmful substances from abandoned or grounded vessels. The regulations introduced under the Proposed Action would have the same direct and indirect benefit on biological resources as described above for the GFNMS.

Davidson Seamount

The Proposed Action would incorporate the Davidson Seamount area into the boundaries of MBNMS. The Davidson Seamount is a biologically significant area and one of the largest known seamounts in US waters. Its inclusion into MBNMS would increase the size of the Sanctuary by approximately 15 percent (equivalent to approximately 585 square nm; 775 square miles; 2,000 square km) and would protect a greater number of benthic biological resources. Seamounts are known to offer unique biological environments and to contain unusual species and species assemblages. The Proposed Action would incorporate changes at MBNMS for this area, creating added protection for the benthic and surrounding communities of the Davidson Seamount.

Potential threats to the resources of the Davidson Seamount include bioprospecting, marine debris/dumping, and harvesting, which would affect endemic species. These species are known to have lower resilience, on the whole, to disturbance. These threats also would disturb the benthic habitat and seabed and their associated resources. In particular, protection from physical damage and collection is needed for the fragile and long-lived species, such as corals and sponges, that occur in this habitat.

The proposed regulation would protect Davidson Seamount from future disturbance or from resource exploitation. The standard MBNMS discharge regulations and seabed disturbance regulations relating to drilling, dredging, seabed alterations, construction, and anchoring would apply in the DSMZ (with certain exceptions). At depths greater than 3,000 feet (914 meters) below the sea surface, the NMSP would prohibit moving, removing, taking, collecting, harvesting, disturbing, breaking, cutting, or other wise injuring Sanctuary resources (or attempting to do those activities), except for fishing, which is prohibited pursuant to the MSA (50 CFR part 660). The Sanctuary would also prohibit the possession of Sanctuary resources taken from below 3,000 feet within the DSMZ, except for the possession of fish resulting from fishing, which is

prohibited pursuant to the MSA. The NMSP would rely upon the NOAA Fisheries regulatory amendments to the Groundfish FMP to regulate any fishing-related impacts below 3,000 feet. The specific amended regulation prohibits fishing with dredge gear, beam trawl, certain types of bottom trawl, and bottom-contact gear or any other gear that is deployed at depths greater than 500 fathoms (3000 feet) (71 FR 27408). Therefore, fishing would take place in the water column above 3,000 feet but not below it and as such fishing activities would not impact the seamount. By incorporating the seamount into MBNMS, its resources would be protected, and opportunities would be provided for a better understanding of the seamount. Therefore, the increased level of resource protection provided by this Proposed Action would have significant beneficial impacts on the biological resources of the Davidson Seamount by limiting disturbance or injury.

Motorized Personal Watercraft

A new definition is proposed for MPWC that would directly benefit biological resources by reducing disturbances to marine mammals, birds, sea turtles, and other fauna and flora. The proposed regulatory change would revise the definition of MPWC to meet the original intent of the regulation when the sanctuary was designated in 1992. Redefining MPWC would encompass all MPWCs and would make them all subject to the existing Sanctuary regulation, which restricts them to the four existing and one new seasonal MPWC zones (see Figure 2-5). This would minimize disturbances to marine wildlife caused by MPWC, enhance existing habitat, and reduce human disturbance in Sanctuary waters. MPWC are small, fast, and highly maneuverable craft. Their small size, shallow draft, instant thrust, and quick reflex enable them to operate at high speeds and close to shore areas that typically have a high number of biological resources. MPWC commonly accelerate and decelerate repeatedly and unpredictably and travel at rapid speeds directly toward shore (versus motorboats, which generally slow down as they approach shore). Current regulations restrict MPWC to four specific zones within MBNMS. However, the current definition of MPWC does not cover all types of these watercraft. Watercraft that are larger and can accommodate three or more persons are not currently included in the existing definition of MPWC and therefore are not subject to the regulations. These larger models are preferred in the high-energy ocean environment due to their increased power, range, and towing ability. Additionally, MPWC use is often multiplied since they are operated in pairs or larger groups. MPWC use is often sustained in a relatively confined area, potentially concentrating impacts over time in remote areas.

These watercraft are particularly disturbing to marine mammals and seabird colonies due to the high noise levels they can produce and the associated frequent speed changes that produce mechanical ratchets and whines underwater, sounds known to disturb marine mammals and birds. Numerous assessments of MPWC impacts indicate that unrestricted use by such craft poses a threat to wildlife. These craft are already restricted in MBNMS and GFNMS and have been restricted in waters off Maui during the Hawaiian humpback whale breeding season due to the high incidence of harassment of the animals that inhabit the coastal zones (Hurley 2004).

Data has shown that sounds from MPWC elicited stronger responses in wildlife than that from motorboats. Studies have also shown a broad range of impacts related to sounds MPWC produce (both in air and water), causing disturbance reactions in birds and mammals. Reactions include the following:

- Seabirds abandon their nests and have lower reproductive success (Burger 1998);
- Cetaceans and pinnipeds, especially mother/pup pinnipeds, are disrupted (Green et al. 2002); and

- Species exhibit such reactions as alarm, flight, avoidance, disturbance, changes in community structure, loss of habitat use, and in some cases, even mortality (National Park And Conservation Association 1999; Snow 1989).

The additional access MPWCs allow to remote and sensitive shoreline areas increases wildlife disturbance. Slow-moving or unaware animals can be injured or killed by direct impact with an MPWC. Proposed MPWC restrictions would protect important and sensitive biological areas, as well as the nearshore kelp beds and surf areas where sea otters, harbor seals, and sea lions congregate.

The proposed definition change would expand the current definition to cover all categories of MPWC and would eliminate the loophole for larger vehicles. Significant beneficial environmental impacts on biological resources are expected from the Proposed Action due to the reduction of disturbance to wildlife.

White Shark Attraction

Extending the prohibition on attracting white sharks anywhere in the sanctuary, rather than just within State waters, would have the potential to provide benefits for biological resources. As described in Section 3.3.8 (analysis of proposed white shark regulation in GFNMS), attraction activities alter natural feeding and breeding behavior of white sharks. Although there are no currently known white shark attraction activities that take place beyond State waters, the proposed prohibition would protect the species from potential threats in the future. This protection is considered a beneficial impact on biological resources.

Dredge Disposal—SF-12

The Proposed Action would relocate disposal site SF-12 to the head of Monterey Canyon. Disposal of dredged material in the ocean adversely affects the marine environment in numerous ways, including smothering benthic organisms, increasing water column turbidity, which affects foraging and predator/prey relationships, increasing sedimentation and decreasing water quality, and degrading adjacent habitats. Current impacts from dredge disposal in MBNMS would be shifted from the present location to the head of the canyon; the result of this move is a decrease in impacts on biological resources, since the new location is expected to reduce effects of dredge disposal on the shallow nearshore and dilute it over a deep water canyon. Placing the material as close to the head of the canyon as possible should increase the flow of sediment into the deep-sea fan. This would have several effects, including reducing environmental impacts on local beaches caused by disposal in the nearshore subtidal area. Disposal in this area has caused material to be washed onshore, resulting in adverse impacts on beach habitat. Moving the site would also reduce siltation, which would reduce cloudiness in the water and benefit biological resources. Moving the SF-12 dredge disposal site from its existing location to the new site would not result in any new impacts associated with dredge disposal. Moving the site is expected to reduce turbidity associated with dredged sediment washed into the surf zone at Moss Landing, which causes localized impacts. An increase in the percentage of volume of material that enters the Monterey Canyon would reduce sedimentation in the nearshore benthic areas north of the canyon, where much of the disposal occurs at this time. Disposal at the head of the Monterey Canyon may result in a turbidity current that would move the sediment to the deep-sea fan. No increase in the volume of dredge material volume is a part of this action. An overall beneficial impact is expected for biological resources.

Alternative Regulatory Actions

The alternatives would have the same impacts as those identified in the Proposed Action, with the differences detailed below.

Davidson Seamount Circular Boundary Alternative

Under this alternative, a larger (circular) area 707 square nm (937 square miles; 2,425 square km) versus 585 square nm (775 square miles; 2,007 square km) around the Davidson Seamount would be incorporated into MBNMS (see Figure 2-4). Compared to the Proposed Action, this alternative would provide a greater level of beneficial impacts on biological resources because it would increase the size of the area that would be protected and that would receive the advantages of all the prohibitions and restrictions described under the Proposed Action.

Davidson Seamount NMSA Alternative

Under this alternative, the same geographic area as identified in the Proposed Action would be incorporated into MBNMS as well as the same regulations. The only difference is that NMSP would issue a regulation, under the authority of the NMSA, prohibiting all fishing below 3,000 feet (914 meters) rather than allowing lawful fishing and relying on NOAA Fisheries to impose fishing restrictions. This alternative would be implemented if NOAA Fisheries did not impose restrictions on fishing in water depths greater than 3,000 feet (914 meters) below the surface that met the Sanctuary's goals and objectives for protecting the benthic habitats in this area. This regulatory alternative would have greater beneficial impacts for biological resources than described for the Proposed Action since, in addition to the benefits listed in the Proposed Action, it would directly regulate impacts on biological resources resulting from the use of bottom-contact fishing gear on Davidson Seamount. However, the beneficial impacts would be the same as the Proposed Action if the NOAA Fisheries regulations that prohibit bottom-contact gear on Davidson Seamount are considered.

Motorized Personal Watercraft Alternative

Under this alternative, the four designated MPWC zones would be eliminated, thereby prohibiting all MPWC use in the Sanctuary. This would provide a significantly greater beneficial impact on biological resources, as the protections described above under the Proposed Action would be realized throughout the Sanctuary. The elimination of any MPWC from MBNMS would reduce accidental user intrusions into restricted areas. Biological resources and habitats would suffer fewer intrusions from noise and sounds, fewer interactions or harassment from human disturbance, and no potential injurious or deadly collisions with these particular craft.

The No Action Alternative

Under the No Action alternative, the Sanctuary would continue to be managed as it is now. No additional protections, such as those regarding deserted vessels, dredge disposal, and MPWCs, would be implemented. The No Action alternative would maintain the status quo and would not provide the Sanctuary with enhanced protections benefiting habitat protection, water quality, and wildlife (biological resources). The Davidson Seamount would not be incorporated into MBNMS, and current MPWC use would be allowed to continue. The adverse impacts from ongoing MPWC use, which allow continued disturbance of wildlife, would be less than significant, as would the potential impacts on resources at Davidson Seamount if it is not incorporated into the Sanctuary.

3.3.10 Cumulative Impacts

The ROI for cumulative impacts includes the coastal, nearshore, and offshore areas of the three sanctuaries and Davidson Seamount. This section addresses the cumulative effects on biological resources from many sources and causes, including noise, fishing activities, decreased water quality, reduced or degraded habitat, reduction in prey availability, and increases in human disturbances.

Cumulative actions that may affect biological resources must take into account the amendments to or establishment of new fisheries management plans (FMPs) by the PFMC or the CDFG. The PFMC FMPs are intended to manage specific fisheries on a sustainable basis, minimize non-target catches, and conserve those habitats that are essential to commercially caught species. As such, the FMPs are intended to benefit or at least sustain managed fish populations and, thereby, may have an indirect beneficial impact on other species that prey on fish and benefit biological resources overall. The PFMC is required to amend these management plans on a regular basis. The NOAA Fisheries regulations amending the groundfish FMP closes a number of areas within the ROI to bottom trawling and certain areas to fishing that contacts the bottom, which will serve to protect and preserve groundfish and other bottom-dwelling species, as well as the benthic ecosystem as a whole. In addition, the California Fish and Game Commission proposes new or amended regulations regarding fishing gear, total allowable catch or specific restrictions for specific fisheries, marine protected areas, and trip limits (CDFG 2004). Other laws and regulations that relate to cumulative actions on biological resources include the state krill ban, and the Marine Life Protection Act Initiative. All these fishery regulations and actions will provide enhanced protections to the ecosystem and benefit biological resources.

In addition to the practices listed above, other cumulative actions affecting biological resources include implementing the FMPs for the three sanctuaries. These FMPs include numerous protections and additional guidance that, when incorporated, would benefit biological resources, although usually indirectly, through consultation, conditions on permits to protect resources, studies and surveys, and outreach programs. Beneficial impacts are expected from the Bolinas Lagoon Restoration Project, which is expected to restore or enhance ecological conditions and processes in the lagoon and increase tidal flow, and from the Big Lagoon Restoration Project, which would have similar beneficial effects from restoring natural ecological conditions and processes but adverse impacts on biological resources because of easier access for the public to the beach and the restored wetland area. Newly updated general plans being prepared by relevant counties are expected to provide a sound basis for making decisions about the amount and location of future growth in the respective counties. This would have beneficial impacts on water resources and quality, and therefore on the environment and habitat for biological resources. Finally, both GFNMS and MBNMS will continue to implement specific activities of their respective water quality action plans.

However, cumulative trends in the ROI are mixed. Some projects/programs (such as those listed above) are expected to increase the beneficial impacts on biological resources, while others may cause short-term or long-term adverse impacts. Adverse short-term impacts may result from the proposed installation of an advanced cabled observatory in Monterey Bay and longer-term impacts may occur from seawall and shore armoring projects along the shoreline of the ROI. Several ongoing or planned projects would increase development in the coastal zone, which would in turn increase beach use, recreational activity, noise, habitat disturbance, and garbage dispersal, all of which would have negative impacts on biological resources.

The Proposed Action

The Proposed Action would not contribute to any of the cumulative adverse trends in biological resources described above, so there would be no cumulative adverse impacts. Existing regulation and future management efforts, such as fisheries management plans and associated regulations implemented by the PFMC, NOAA Fisheries, and CDFG would continue to benefit and protect biological resources. The FMPs for the three sanctuaries include numerous protections and guidance which, when implemented, provide additional protection to biological resources. The Proposed Action would help mitigate ongoing adverse cumulative trends and would contribute to the cumulative beneficial trends because impacts on biological resources from the Proposed Action are expected to be beneficial.

Alternative Regulatory Actions

The contribution to cumulative trends would be the same as those described under the Proposed Action, with a small increase in the level of beneficial impacts due to the increased levels of protection afforded by these alternatives, such as the MPWC prohibition and the larger area of protection for Davidson Seamount under the circular boundary alternative.

The No Action Alternative

The No Action alternative would maintain the status quo of sanctuary management. No additional resource protections from proposed regulations would occur. Some ongoing adverse impacts would continue (such as wildlife disturbance from MPWC use); these would continue to be part of ongoing adverse cumulative trends within the ROI described above. There would also be cumulative beneficial trends on biological resources from existing regulation and future management efforts, including implementation of the FMPs and the NOAA Fisheries regulations.

3.4 OCEANOGRAPHY AND GEOLOGY

This section addresses the geologic and oceanographic resources of the three sanctuaries. The ROI includes the nearshore environment, the continental shelf, slope, canyons and deep-sea plains within the sanctuaries and the proposed Davidson Seamount addition to MBNMS, and the physical properties of the overlying marine environment.

3.4.1 Regional Overview of Affected Environment

Geology

Geologic features in the sanctuaries include rocky shores, sandy beaches, estuaries, bays, lagoons, islands, submerged islands, pinnacles, ridges, underwater canyons, the continental shelf, the slope, and the abyssal plain, which reaches depths of over 10,000 feet (3,000 meters). Bottom types on the continental shelf include the sand and mud sediments, rocky outcrops, reefs, and seamounts. Some of the unique features of the ROI include cold seeps, underwater canyons, tectonic features, and fossils. The project area is located on a plate boundary that separates the North American and Pacific Plates and is marked by the San Andreas Fault. This seismically active region experiences regular earthquakes, submarine landslides, turbidity currents, flood discharges, and coastal erosion.

Each of the sanctuaries has notable geological features. Cordell Bank is an offshore granite bank, about 4.5 miles (7 km) wide and 9.5 miles (15 km) long, located 50 miles (80 km) northwest of the Golden Gate Bridge and 20 miles (33 km) west of Point Reyes. This granite block was created as part of the southern Sierra Nevada range some 93 million years ago. The Bank is one of the few offshore areas where the granite block emerges from the newer sediments that make up most of the continental shelf. The bottom of the bank slopes gently from depths of 175 to 210 feet (53-64 meters). Jagged ridges and pinnacles rise abruptly from this plain and reach up to 140 to 120 feet (42-36 meters) below the sea surface. Cordell Bank is surrounded by the continental shelf and its soft sediments.

GFNMS has the widest continental shelf area (32 nm; 37 miles; 59 km) on the Pacific coast of the contiguous United States, and it also contains the most significant islands of the three sanctuaries. Shoreward of the Farallon Islands, the continental shelf is a relatively flat sandy to muddy plain, which slopes gently to the west and north from the mainland shoreline. The Farallon Islands lie along the outer edge of the continental shelf. The islands are located on part of a larger submarine ridge and extend for a distance of approximately 10 nm (11.5 miles; 18.5 km) near the shelf break. Several coastal embayments including Bolinas Lagoon, Bodega Bay, Drakes Bay, Estero Americano, Estero de San Antonio, and Tomales Bay, are located within GFNMS. Bolinas Lagoon, Drakes Bay, and Bodega Bay are open to the ocean, but are somewhat protected from southward moving coastal currents by Duxbury Point, Point Reyes Headlands, and Bodega Head, respectively. Tomales Bay and Bolinas Lagoon are actually submerged rift valleys formed by the San Andreas Fault. The shoreline along the mainland coast is comprised of sandy beaches and rocky cliffs.

MBNMS extends from the Rocky Point (7 miles [11 km] north of the Golden Gate Bridge) in the north to Cambria in the south, covering a shoreline length of approximately 276 miles (444 km). MBNMS is characterized by its deep underwater canyons, the largest of which is the Monterey Canyon. The deepest point of MBNMS lies within the Canyon and is approximately 10,660 feet (3,250 meters) deep, making it deeper than the Grand Canyon. MBNMS lies along the San Andreas fault system, consisting of the Hayward-Calaveras and San Andreas fault zones on land, and the Palo Colorado-San Gregorio fault zones offshore. The Monterey Canyon cuts across the north-south trending faults in Monterey Bay, and is the result of

tectonic activity occurring since subduction of the Pacific Plate ceased and transform motion began, about 21 million years ago. The Canyon has also been shaped by landslides and turbidity currents created by mass wasting events. These steepen the Canyon's walls, expose basement and bedrock, and erode the Canyon (NOAA 2002).

Near the southwest corner of MBNMS is Davidson Seamount. The Seamount is 26 miles (42 km) long and rises 7,870 feet (2,400 meters) from the ocean floor, and its summit is 4,120 feet (1,256 meters) below the sea surface. Seamounts are important geologic features and also have significant biological value for the habitat and feeding ground they provide to a number of species.

Oceanography

The oceanographic setting of the ROI is characteristic of temperate mid-latitude eastern boundary current. The cold California Current and comparatively warm Davidson Current dominate the circulation pattern.

The calendar year at CBNMS can be broken into three oceanographic seasons: upwelling season, relaxation season, and winter storm season. The upwelling season typically begins with the spring transition, characterized by strong persistent winds from the northwest. This usually occurs sometime in late February or early March, and is the start of the annual productivity cycle along northern and central California. During this season, upwelling driven by winds from the northwest alternates with periods of calm. These winds generally begin to subside by late July. August through mid-November is the relaxation season. During this time, winds are mostly light and variable, and the seas can be calm for one to two weeks at a time. This changes abruptly with the arrival of the first winter storms from the Gulf of Alaska. From late November through early February, winter storms create large waves and strong winds along the coast. Physical processes operating on different temporal and spatial scales drive hydrodynamics on and around the bank. Cordell Bank lies in the path of the California Current, one of four major eastern boundary currents in the world. Current-topography interactions on banks and seamounts include semi-stationary eddies (Taylor columns), internal wave reflection, tidally induced currents eddies, and trapped waves. The relief and position of Cordell Bank also drives localized upwelling as the wind driven south flowing current encounters the granitic relief of Cordell Bank. The prevailing California Current flows southward along the coast while the upwelling of nutrient-rich, deep ocean waters stimulates the growth of planktonic organisms.

Circulation in the Gulf of the Farallones is primarily composed of two major currents: the southward flowing California Current and the northward flowing Davidson Current. In addition, a number of local eddy current dynamics and the outflow from San Francisco Bay's estuarine ecosystem exert influence on regional water circulation patterns. The California Current is situated fairly close to the coast at most times, and brings water into the Gulf which is noticeably cooler and less saline than offshore waters. The oceanic period associated with the California Current typically lasts from late summer to early fall, approximately August-September to mid-November. Toward mid-November, the Davidson Current flows counter, e.g. northward, to the California Current, bringing warmer water at the surface. Like the oceanic period, nearshore eddies also characterize this phase in many places. Northward flowing waters function as the dominant inshore transporter of suspended nutrients. Southwest winds and the Coriolis effect drive Davidson Current waters shoreward so as to displace coastal waters and induce downwelling. In roughly mid-February, an upwelling period commences, lasting into September. This phase correlates with intermittent shifts in prevailing winds from south to northwest, thus diminishing or reversing the previously northward flow of surface water. In spring and summer, as the broad California Current streams southward, surface water is carried offshore. Deeper water, which is cold, dense, and nutrient-rich, rises up to take its place.

The oceanographic setting in MBNMS is similar to that described for CBNMS and GFNMS, in that it shaped by the California Current and the Davidson Current, with seasonal upwelling in localized areas off Año Nuevo and Pt. Sur. When upwelling ceases at the end of summer (typically August or September), sea level along the coast and inside Monterey Bay rises and the California Current slows. Sea surface temperatures along the coast may rise markedly. Later in the year (typically November) when winter storms bring occasional strong southerly winds, transport is shoreward, and in places the surface current becomes northerly. Some authors refer to this northward-flowing current as the Davidson Current, and others recognize it as the surfacing of the California Undercurrent. This flow is a deep coastal boundary current with a core depth of about 250 meters during spring and summer, and speeds that can be as strong as the surface California Current. Though wind-driven upwelling does not normally occur within Monterey Bay due to the topographic break of the coastal mountains afforded by the Salinas Valley, some upwelled water may be transported into the Bay from areas to the south of Año Nuevo (NOAA 2002).

Longer-term oceanographic variations also occur in the ROI, including sporadic El Niño Southern Oscillation (ENSO) events, Pacific Decadal Oscillation, and global warming. These phenomena affect local physical and biological systems. In the central-north coast region of California, ENSO events are marked by the warming of nearshore waters due to equatorial Pacific trade winds relaxing. The onshore and northward flow increases, and coastal upwelling of deep, nutrient-rich water diminishes. Pacific Decadal Oscillation events are known to occur every 20 to 30 years (the most recent event occurred in 1998). These events occur when the surface waters of the central and northern Pacific Ocean shift several degrees from the mean water temperature. The waters off the California coast have warmed significantly over the last forty years, possibly a result of global warming or interdecadal climate shift (NOAA 2003b).

3.4.2 Regulatory Environment

CBNMS, GFNMS and MBNMS each have regulations that prohibit exploring for, or developing, or producing, oil, gas, or minerals in the Sanctuary (with an exception for jade in portions of MBNMS). In addition, GFNMS and MBNMS have regulations that prohibit drilling into, altering, or placing structures on the seabed.

California Coastal Sanctuary Act of 1994, Cal. Pub. Res. Code §§ 6240-6244

Since 1994, all new oil and gas exploration or drilling within California state waters has been permanently banned (to 3 nm [3.5 miles; 5.5 km] from the shore). This comprehensive ban on new oil and gas leasing in State waters was enacted through the California Coastal Sanctuary Act of 1994. The California Coastal Sanctuary Act created a comprehensive statewide coastal sanctuary that prohibits future oil and gas leasing in state waters, from Mexico to the Oregon border, in perpetuity. Existing oil and gas leases are added to the sanctuary as they are quitclaimed to the state.

Presidential Directive

Since 1982, there has been an annual moratorium placed by Congress on oil and gas leasing and development on the federal Outer Continental Shelf (OCS) adjacent to California. State tide and submerged lands include the area from the mean high tide line seaward to the 3 nm (3.5 miles; 5.5 km) boundary with the federal OCS. President Clinton issued a Presidential Directive under the OCS Lands Act in 1998 that blocked new leasing activity until at least 2012. President Bush rescinded this moratorium except in National Marine Sanctuaries. The Davidson Seamount area is located within the federal OCS and is currently subject to the following regulations.

Submerged Lands Act, 43 U.S.C. § 1301 et seq.

Under the Submerged Lands Act (SLA) the location of energy and mineral resources determines whether or not they fall under state control. The SLA granted states title to the natural resources located within three miles of their coastline. For purposes of the Submerged Lands Act, the term "natural resources" includes oil, gas and all other minerals.

Outer Continental Shelf Lands Act, 43 U.S.C. § 1331 et seq.

The Outer Continental Shelf Lands Act (OCSLA), established federal jurisdiction over submerged lands on the OCS seaward of state boundaries. Under the OCSLA, the Secretary of the Interior is responsible for the administration of mineral exploration and development of the OCS. The OCSLA provides guidelines for implementing an OCS oil and gas exploration and development program, and authorities for ensuring that such activities are safe and environmentally sound.

Deep Seabed Hard Mineral Resources Act, 30 U.S.C. § 1401 et seq.

The Deep Seabed Hard Mineral Resource Act provides regulations for developing deep seabed hard minerals, requires consideration of environmental impacts prior to issuance of mineral development permits, and requires monitoring of environmental impacts associated with any mineral development activities. With regard to minerals on the deep seabed, seabed nodules contain nickel, copper, cobalt and manganese - minerals important to many industrial uses. No commercial deep seabed mining is currently conducted, nor is such activity anticipated in the near future.

Ocean Thermal Energy Conversion Act, 42 U.S.C. § 9101 et seq.

With regard to alternative energy sources from the ocean, the Ocean Thermal Energy Conversion (OTEC) Act established a licensing program for facilities and plants that would convert thermal gradients in the ocean into electricity. The OTEC Act directed the Administrator of NOAA to establish a stable legal regime to foster commercial development of OTEC. In addition, the OTEC Act directed the Secretary of the department in which the USCG is operating to promote safety of life and property at sea for OTEC operations, prevent pollution of the marine environment, clean up any discharged pollutants, prevent or minimize any adverse impacts from construction and operation of OTEC plants, and ensure that the thermal plume of an OTEC plant does not unreasonably impinge on and thus degrade the thermal gradient used by any other OTEC plant or facility, or the territorial sea or area of national resource jurisdiction of any other nation unless the Secretary of State has approved such impingement after consultation with such nation. The OTEC Act also assigned responsibilities to the Secretary of State and the Secretary of Energy regarding OTEC plants.

Energy Policy Act of 2005, Pub.L. 109-58

The Energy Policy Act of 2005 addresses offshore renewable energy and alternative uses of outer continental shelf (OCS) oil and gas facilities. The Energy Policy Act amends the OCS Lands Act (OCSLA) to authorize the US Department of the Interior (DOI) to act as lead federal agency for certain alternative energy and marine-related uses on the OCS. DOI has delegated OCSLA authority to DOI's Minerals Management Service. The Energy Policy Act states that the Secretary of the Interior may grant a lease, easement, or right-of-way on the OCS for activities that: support production of energy from sources other than oil and gas; support exploration, production, storage, and transportation of oil and gas; or use for other purposes facilities currently or previously used for OCSLA-authorized activities. For oil and gas, the Energy Policy Act provides production incentives, resource assessments and inventories, and calls for the preservation of geological and geophysical data. It should be noted that this act does not apply in National Marine Sanctuaries.

3.4.3 Significance Criteria and Impact Methodology

Impacts on the geological and oceanographic resources are considered to be significant if the Proposed Action results in any of the following:

- Allows for exploitation of geologic resources inconsistent with the plans and policies of the NMSP;
- Degrades the physical structure of any geologic resource that is measurably different from pre-existing conditions;
- Alters any oceanographic process, such as sediment transport, that is measurably different from pre-existing conditions; or
- Otherwise violates the NMSP regulations.

The methodology used to conduct the geological and oceanographic impact evaluation was to consider each of the proposed actions individually and to assess any potential impacts on these resources. The overall methodology used is consistent with CEQ guidance and the NOAA NEPA guidelines (NAO 216-6).

3.4.4 Cross-Cutting Regulations – Environmental Consequences

None of the proposed or alternative cross-cutting regulations are expected to have impacts on oceanographic or geological resources within the three sanctuaries.

3.4.5 Cordell Bank National Marine Sanctuary – Environmental Consequences

The Proposed Action

Seabed Protection

The proposed regulation would prohibit drilling, dredging, or altering, constructing, placing, or abandoning any structure, material or matter on or in the submerged lands within the line representing the 50-fathom isobath surrounding Cordell Bank,. Additionally, the regulation would prohibit the same activities listed above in the remainder of the sanctuary outside the 50-fathom isobath, with the exception of anchoring. Implementing and clarifying regulations that address seabed protection within the Sanctuary would have a beneficial impact on the geology, whether the protection is from preventing any type of future drilling (no drilling currently takes place or is proposed) or from reducing activities (such as placing structures or dredging) that could physically disturb, harm, or injure the seafloor structure. The prohibitions would safeguard the fragile high relief on the Bank, particularly the pinnacles and ridges, from the threat of permanent destruction. The proposed regulatory change would clearly eliminate or at least reduce the likelihood of detrimental activities from affecting the seafloor, particularly on Cordell Bank. Therefore, the regulation would result in enhanced protections for the benthic environment and their associated biological assemblages.

Concern remains about the fragile quality of the Bank, particularly the high relief pinnacles and ridges and benthic organisms covering the Bank. Unlike habitats such as kelp forests and coral reefs, once the granite pinnacles have been compromised, there is no opportunity for recovery; they can and will remain rubble. The pinnacles and ridges of the Bank provide a hard substrate for attachment resulting in the thick coverage on the Bank comprised of sponges, anemones, hydrocorals, hydroids, and tunicates, and scattered crabs, holothurians, and gastropods. This benthic coverage in turn provides important habitat and food for fishes and other living marine resources. This area is one of complexity, sensitivity and ecological importance.

As described in Chapter 2 (Project Description), there are several human use activities that would be considered a threat to the sensitive seabed within the 50-fathom isobath surrounding Cordell Bank. The proposed regulation would, in effect, prohibit the following potential activities such as, but not limited to: marine bioprospecting, cultural resource salvage, and seafloor cable installation. At this time none of these activities occur on the Bank nor are planned in the future. This proposed new prohibition would serve to protect the unique and fragile geologic integrity of the Cordell Bank and associated benthic resources and habitats. Therefore, the Proposed Action would have potential beneficial future impacts on the geologic resources of the Sanctuary.

Benthic Habitat Protection

Clarification to the existing benthic habitat regulation that prohibits the removal, taking, or injuring benthic invertebrates or algae on the Bank inside the 50-fathom isobath will have the same amount of protection as the existing regulation and would result in no adverse impacts on oceanography and geology.

Alternative Regulatory Actions

The alternatives would have the same impacts as identified in the Proposed Action, with the following differences.

Seabed Protection Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom contact fishing gear on or within a line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action, that met the Sanctuary's goals and objectives for protecting the benthic habitats in this area. Under this alternative, NOAA would issue a regulation under the authority of the NMSA prohibiting bottom-contact fishing gear within the 50-fathom isobath surrounding the Bank. While the lawful use of fishing gear during normal fishing operations would be exempt from the regulation, it would prevent bottom contact gear from use on the Bank. This regulation would result in beneficial impacts to geological resources because in addition to prohibiting drilling, dredging, or altering, constructing, placing, or abandoning any structure material or matter on the submerged lands, it would prohibit the use of bottom contacting fishing gear, which can snag, entangle, break-off, injure and remove fragile bottom habitats on Cordell Bank. This regulatory alternative could have greater beneficial impacts for geological resources than described for the Proposed Action since it would reduce or eliminate potential impacts on biological resources resulting from the use of bottom contact fishing gear on Cordell Bank. However, the beneficial impacts would be the same as the Proposed Action if the NOAA Fisheries regulations that prohibit bottom contact gear on Cordell Bank are considered.

Benthic Habitat Protection Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within the line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action. Under this alternative, in addition to the minor corrections and clarifications, NOAA would issue regulations under the authority of the NMSA prohibiting bottom-contact fishing gear within the 50-fathom isobath around the Bank. In addition, a new definition of bottom-contact fishing gear would be included in the sanctuary regulations. This regulatory alternative would have greater beneficial impacts for geological resources than described for the Proposed Action since it would prohibit potentially harmful physical impacts on geological (and biological) resources resulting from the use of bottom contacting fishing gear on Cordell Bank. However, the beneficial impacts would be the same as the Proposed Action if the NOAA Fisheries regulations that prohibit bottom contact gear on Cordell Bank are considered.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed; this would result in no impact on geologic resources in the ROI. Beneficial effects of the proposed seabed and benthic habitat protection prohibitions would not occur under the No Action Alternative.

3.4.6 Gulf of the Farallones National Marine Sanctuary – Environmental Consequences

The Proposed Action

Oil and Gas Pipeline Clarification

The proposed regulation modifications limit the construction of oil and gas pipelines to those associated with facilities and activities *adjacent to*, rather than *anywhere outside* the Sanctuary. This could result in fewer potential pipelines, should the current oil and gas development moratorium in federal waters be lifted, however, NOAA does not contemplate this happening in the near future. Impacts on oceanography and geology would be negligible, but beneficial.

Alternative Regulatory Actions

There are no alternative actions for GFNMS that would affect oceanography or geology.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed, and no additional restrictions on oil and gas pipelines related to hydrocarbon exploration, development, and production beyond the Sanctuary boundaries would be implemented. The No Action alternative would maintain the status quo and would not provide the Sanctuary with enhanced protections for geologic resources.

3.4.7 Monterey Bay National Marine Sanctuary – Environmental Consequences

The Proposed Action

Davidson Seamount

The proposed regulation would incorporate an area of approximately 585 square nm (776 square miles; 2009 square km) containing the Davidson Seamount into the boundaries of MBNMS. The inclusion of the Davidson Seamount would increase the size of the Sanctuary by 14.6 percent and would afford protection to its significant geological resources.

Potential threats to the resources of the Davidson Seamount include bio-prospecting, extraction, and harvest activities that would disturb the seabed. The standard MBNMS discharge regulations and seabed disturbance regulations relating to drilling, dredging, seabed alterations, construction, and anchoring would apply in the DSMZ (with certain exceptions). At depths greater than 3,000 feet (914 meters) below the sea surface, the NMSP would prohibit moving, removing, taking, collecting, harvesting, disturbing, breaking, cutting, or other wise injuring Sanctuary resources (or attempting to do those activities), except for fishing, which is prohibited pursuant to the MSA (50 CFR part 660). The Sanctuary would also prohibit the possession of Sanctuary resources taken from below 3,000 feet within the DSMZ, except for the possession of fish resulting from fishing, which is prohibited pursuant to the MSA. The NMSP would rely upon the NOAA Fisheries regulatory amendments to the Groundfish FMP to regulate any fishing-related impacts below 3000 feet. By

incorporating the seamount into MBNMS, its geologic resources would be protected, and opportunities would be provided for a better understanding of the seamount. Therefore, the increased level of resource protection provided by this Proposed Action would have significant beneficial impacts on the geological resources of the Davidson Seamount by preventing any type of disturbance or injury.

Dredge Disposal—SF-12

The proposed regulation modification would adjust the location of the SF-12 Dredge Disposal Site to the head of the Monterey Canyon (see Figure 2-5). This will increase the flow of dredged material into Monterey Bay. The purpose of this proposal is to relocate the disposal site to its original intended destination approximately 900 feet farther offshore than its current location and in deeper waters, which would reduce impacts on local beaches caused by disposal in the nearshore subtidal area. Disposal in this area has caused material to be washed onshore, resulting in increased sedimentation.

No increase in the volume of dredge material is a part of this proposed action. Movement of the site farther offshore would reduce siltation in the nearshore environment. Placing the material close to the head of the canyon should increase the flow of sediment into the deep sea fan, as has been observed by USGS researchers. Movement of the SF-12 dredge disposal site from its existing location to the proposed site would have the potential to result in an increase in sedimentation at the new dredge disposal site. However, the material would likely be carried by turbidity currents farther down into the canyon and distributed in the deep water environment, rather than concentrated in the nearshore zone. Movement of the site would reduce impacts associated with dredged sediment being washed into the surf zone at Moss Landing. An increase in the percentage of volume of material that enters the Monterey Canyon will reduce sedimentation in the nearshore benthic areas north of the canyon, where much of the disposal occurs at this time.

The Proposed Action would have slightly adverse impacts for sedimentation processes at the new site location but would have beneficial future impacts on sedimentation process in the current location of the dredge site and along the adjacent shoreline. The US Army Corps of Engineers and USEPA issued a special public notice, in December 2005, announcing the correction of this dredge disposal location (US Army Corps and USEPA 2005). In their announcement, the agencies did not identify any adverse environmental effects and stated that "environmental benefits include reducing the likelihood that suspended sediments will enter the upper water column or affect the adjacent beach." As the expected beneficial impacts on reduced sedimentation in the surf zone are greater than the expected adverse impacts at Monterey Canyon, the Proposed Action would have an overall beneficial future impact on geologic resources in the Sanctuary.

Dredge Disposal—Monterey and Santa Cruz

The Proposed Action would identify, codify, and recognize two dredge disposal sites that have been in use by the Monterey and Santa Cruz Harbor prior to MBNMS designation. Both dredge disposal sites are still in use today. See Section 3.5, Water Quality, for a discussion of these sites. The proposed regulation is considered a technical change with no environmental or socioeconomic impacts. Any modification to the volume or location of dredge material would require a separate permit process and environmental review. The Proposed Action would have no impacts on geological or oceanographic resources in the sanctuaries.

Alternative Regulatory Actions

The alternatives would have the same impacts as identified in the Proposed Action, with the following minor differences:

Davidson Seamount Circular Boundary Alternative

This alternative would define the boundaries of the Davidson Seamount as a circle with a centerpoint at the summit of the Seamount and a radius of 15 nm (17 miles; 28 km). This alternative boundary would encompass 707 square nm (937 square miles; 2428 square km). The proposed regulations for this alternative would be the same as for the Proposed Action. This alternative has the potential to have significant beneficial future impacts on the geologic resources of the seamount and a slightly greater potential beneficial future impact than the Proposed Action, as it would include a larger area.

Davidson Seamount NMSA Alternative

Under this alternative, the same geographic area as identified in the Proposed Action would be incorporated into MBNMS as well as the same regulation that would prohibit moving, removing, taking, collecting, harvesting, disturbing, breaking, cutting, or other wise injuring Sanctuary resources (or attempting to do those activities). However, instead of relying on NOAA Fisheries to protect the benthic habitat from fishing activities on the Seamount, the NMSP would issue a regulation, under the authority of the NMSA, prohibiting all fishing below 3,000 feet (914 meters). This alternative would be implemented if NOAA Fisheries did not impose restrictions on fishing in water depths greater than 3,000 feet (914 meters) below the surface that met the Sanctuary's goals and objectives for protecting the benthic habitats in this area. This regulatory alternative would have greater beneficial impacts for biological resources than described for the Proposed Action since, in addition to the benefits listed in the Proposed Action, the alternative would also directly regulate impacts to biological resources resulting from the use of bottom contacting fishing gear on Davidson Seamount. However, the beneficial impacts would be the same as the Proposed Action if the NOAA Fisheries regulations that prohibit bottom contact gear on Davidson Seamount are considered.

The No Action Alternative

The No Action alternative would continue to manage the Sanctuary as it is currently managed; the Davidson Seamount would not be incorporated into MBNMS. The No Action alternative would maintain the status quo and would not provide the Sanctuary or Davidson Seamount with increased protections of significant geologic resources.

3.4.8 Cumulative Impacts

The ROI for cumulative impacts includes the geologic and oceanographic resources of the three sanctuaries and the proposed Davidson Seamount addition to the MBNMS. This section addresses the cumulative effects on geologic and oceanographic resources from such projects as submerged cables, pier construction, power plants, sewage treatment plants, and implementation of the FMPs.

Adverse impacts on geologic resources in the sanctuaries largely result from construction activities on the seabed or the shoreline of the sanctuaries. Coastal armoring projects are a significant type of development of concern. To prevent natural erosion and protect land developments, shorelines are often fortified with riprap, seawalls, and bluff protection structures. The impacts on geologic resources include modification to sedimentation processes, namely long-shore sediment transport, and can result in beach erosion. Laying submerged cables in the seabed is another type of project that has the potential to cause adverse impacts on geologic resources. Sanctuary regulations prohibit alteration to the seabed but may allow permits for certain cable installations. High voltage power cables, fiber optic cables, and cables for research purposes are types of cables that may be proposed for installation. There is one current proposal for a new marine cable, to be located in MBNMS. Construction of marinas, piers, ports, and related infrastructure is another area of development that can result in adverse impacts on geologic resources. Installing these improvements can

result in disturbance to the seafloor and nearshore sediments. (No new piers are currently proposed in the three sanctuaries.) In addition, the disposal of dredged and landslide materials in the sanctuaries are projects that may increase the rate of sedimentation on the seafloor or along the shoreline.

Projects that may pose adverse impacts on oceanographic processes and properties (namely currents, thermodynamic properties, and salinity) include development of water treatment plants, power plants and desalination plants. Power plants, such as Duke's Moss Landing power plant, input significantly warmer water into the discharge area, affecting the thermodynamics of the nearshore environment. There are no known proposed power plants or water treatment plants. There are some preliminary discussions about desalination plants at several locations in the ROI, but construction is not likely to begin within the next five years. With the increase in coastal population in the central California area, the quantity of water discharged by sewage treatment plants is increasing. In addition to the impacts on water quality discussed in Section 3.5, the large quantity of freshwater impacts the salinity of the water in the receiving environment.

Implementation of the FMPs will contribute to the ROI's regional ecosystem health, including oceanography and geology, by applying the various protective action plans in CBNMS, GFNMS, and MBNMS. Conservation science management contained in the CBNMS action plan could result in additional survey coverage of the Sanctuary, providing more detailed information relevant for managing CBNMS. Similar results could be seen through potential boundary modifications and research and monitoring management under the GFNMS action plan. Coastal development action plans in MBNMS would provide additional data on nearshore oceanography and geography. The NOAA Fisheries regulations have established zones within the ROI where bottom trawling and bottom-contact fishing is prohibited; these help protect geologic resources on the seafloor from disturbance or damage.

The Proposed Action

This project will not contribute to any of the cumulative adverse trends described above; therefore, there will be no cumulative adverse impacts. Impacts on geologic and oceanographic resources from the Proposed Action are expected to be beneficial; therefore the Proposed Action would contribute to an ongoing cumulative beneficial trend, and could mitigate for cumulative adverse trends.

Alternative Regulatory Actions

Under the alternatives, cumulative impacts would be the same as those described under the Proposed Action, with an increase in the level of beneficial impacts due to the increased levels of protection afforded by the alternatives.

The No Action Alternative

The No Action alternative would maintain the status quo of sanctuary management. No additional protections from proposed regulations would occur. Some ongoing adverse impacts would continue; these would continue to be part of ongoing adverse cumulative trends within the ROI. There would also be cumulative beneficial trends from existing regulation and management efforts, including implementation of the FMPs and the NOAA Fisheries regulations. The No Action alternative would not contribute to any cumulative impacts, either beneficial or adverse.

3.5 WATER QUALITY

This section addresses water quality issues related to the proposed actions. The water quality in the sanctuaries is described, and key threats to water quality are identified.

3.5.1 Regional Overview of Affected Environment

The ROI for water quality extends beyond the sanctuaries' boundaries due to the fluid nature of the marine environment and freshwater inputs from rivers and tributaries. Discharges into the marine environment in ocean areas adjacent to the sanctuaries intrude into sanctuary boundaries and impact water quality. The ROI comprises several major estuaries (Tomales Bay, San Francisco Bay, Drakes Estero, Bolinas Lagoon and Elkhorn Slough) and more than twenty coastal rivers that contribute to the nearshore chemical characteristics of the sanctuaries. The major freshwater sources are the Sacramento and San Joaquin rivers that enter the sanctuaries through the San Francisco Bay estuary. These waters are substantially affected by agricultural activities in the Sacramento and Central valleys and by various pollution sources from the San Francisco Bay. The freshwater inputs from the coastal range rivers are minor sources of chemical constituents to the sanctuaries. In total, the ROI includes oceanic waters within the sanctuaries, the marine areas adjacent to the sanctuaries, including the proposed Davidson Seamount addition to the MBNMS, and the watersheds contributing to the chemical composition in the sanctuaries.

In general, the marine water in the sanctuaries is considered to be of relatively good quality. This is primarily attributed to the rural nature of most of the northern/central coast of California (NOAA 2003d). However, there are nonetheless a number of persistent threats to water quality in the sanctuaries. The marine environment in offshore areas is more pristine than in nearshore areas, which are affected by land-based nonpoint source pollution. Coastal marine areas, including harbors, lagoons, estuaries, and tributaries, are known to have a number of problems, including elevated levels of nitrates, sediments, persistent pesticides, metals, bacteria, pathogens, detergents, and oils (NOAA 2003c, 2003d, 2003e). Other sources of marine water pollution include marinas and vessel pollution, spill incidents, illegal dumping, and residual dumping from historic dumping activities (NOAA 2003d). Key sources of pollution, especially as related to the Proposed Action, are described in greater detail below.

Land-based Pollution (Point Source and Nonpoint Source)

Livestock grazing, agriculture, and historic mining are primary sources of land-based nonpoint source pollution affecting the sanctuaries, particularly in the nearshore environment. While the threat is relatively minor for most of the coastal marine area of the sanctuaries due to distances from pollution sources and the strong circulation patterns of the Pacific, the discharge of the San Francisco Bay Estuary is a significant threat to the water quality of the sanctuaries. The San Francisco Bay Estuary carries a pollution load generated by the approximately 8 million people living in the San Francisco Bay Area as well as effluent from the agricultural Central Valley via the Sacramento and San Joaquin rivers. Numerous contaminants exiting the San Francisco Bay, including agricultural and livestock waste, wastewater, sewage outfalls, historic mining, and industrial wastes, produce a contamination plume termed the San Francisco Bay Plume. The San Francisco Bay Plume can, under certain conditions, extend outward to the offshore edge of the sanctuaries.

Other land-based pollution of nearshore waters, particularly in MBNMS, includes runoff from urban, suburban and rural areas, aging sewer infrastructure systems, flows from creeks and rivers, and other unknown or unidentified sources. Some sewer systems have been known to overflow into MBNMS during

storm events. Concentration of microbial contaminants in nearshore waters has resulted in numerous beach warnings and beach closures in MBNMS.

Vessel Discharges

During the course of normal operations, seagoing and coastal transiting vessels produce a multitude of wastes, which, when disposed of into the marine environment, can impact the water quality of the sanctuaries. Potential discharges from vessels include sewage, graywater, bilge water, ballast water, hazardous wastes, and solid wastes. These are discussed below.

Sewage

Sewage (also referred to as black water) includes vessel sewage and other wastewater (e.g., from medical facilities onboard cruise ships). Sewage from ships is generally more concentrated than sewage from land-based sources, as it is diluted with less water when flushed (three quarts versus three to five gallons). Sewage discharge may contain bacteria or viruses that cause disease in humans and other wildlife. High concentrations of nutrients in sewage, namely nitrogen and phosphorous, can lead to eutrophication, the process where an aquatic environment becomes rich in dissolved nutrients, causing excessive growth and decomposition of oxygen-depleting plant life, and resulting in injury or death to other organisms. Chemicals and deodorants often used in MSDs, including chlorine, ammonia, or formaldehyde, also impact water quality. Section 312 of the CWA (33 U.S.C. § 1322) requires the use of MSDs for all vessels within 3 nm (3.5 miles; 5.5 km) offshore; raw sewage can be legally discharged beyond 3 nm. Vessels over sixty-five feet in length must have a Type II or Type III MSD. In the sanctuaries, the discharge of raw sewage is prohibited, and it is required that properly functioning marine sanitation devices be used when discharging sewage waste (NOAA 2003c, 2003d, 2003e). Type I MSDs rely on maceration and disinfection for treatment of the waste prior to its discharge into the water. Type II MSDs provide an advanced form of the same type of treatment used by Type I devices and discharge wastes with lower fecal coliform counts and reduced suspended solids. A Type II MSD must meet a water quality standard of 200 fecal coliform per 100 ml of water, for sewage treatment. Type III MSDs, commonly called holding tanks, flush sewage from the marine head into a tank containing deodorizers and other chemicals. The contents of the holding tank are stored until the contents can be properly disposed of at a shore-side pump-out facility. Type III MSDs can be equipped with a discharge option, usually called a Y-valve, which allows the boater to direct the sewage from the head either into the holding tank or directly overboard.

Graywater

Graywater from vessels is commonly viewed to include wastewater from kitchens, showers, laundry facilities, and galleys. Under the Clean Water Act, graywater does not include wastewater from laundry facilities. Pollutants in graywater include suspended solids, oil, grease, ammonia, nitrogen, phosphates, copper, lead, mercury, nickel, silver and zinc, detergents, cleaners, oil and grease, metals, pesticides, and medical and dental wastes. Graywater discharge is currently prohibited in CBNMS and GFNMS .

Bilge Water

Bilge water includes fuel, oil, wastewater, other chemicals, and materials that collect at the bottom of the ship's hull with fresh and seawater. Under the Oil Pollution Act and the CWA, vessels are prohibited from releasing any discharge with an oil content of greater than fifteen parts of oil per one million parts water (ppm) within 22 km (12 nm; 14 miles) of the coastline. Beyond 22 km, discharges with oil content greater than 100 ppm are prohibited (NOAA 2003c, 2003d, 2003e). Existing MBNMS regulations prohibit any discharge of bilge water with any concentration of oil.

Ballast Water

Large vessels can take on millions of gallons of ballast water, often from coastal waters in one location, and discharged at another. Ballast operations have led to the introduction of invasive species, which are considered a threat to water quality and can disrupt marine ecosystems. Ballast water appropriation and discharge within state waters is regulated by the California Marine Invasive Species Act (AB 433, 2003), the California Coastal Ecosystems Protection Act (SB 497, 2005) and California Code of Regulations, Title 2, Division 3, Chapter 1, Article 4.6, "Ballast Water Regulations for Vessels Arriving at California Ports of Places after Departing from Ports or Places within the Pacific Coast Region" (2007).

The Marine Invasive Species Act (AB 433, 2003) and the California Code of Regulations Title 2, Division 3, Chapter 1, Article 4.6 contain specific ballast water discharge requirements applicable to all vessels weighing 300 gross registered tons or more. Article 4.6 requires all vessels arriving at a California port or place from another port or place within the Pacific Coast Region to (1) exchange ballast water in near-coastal waters before entering the waters of the State if that ballast water was taken on in a port or place within the Pacific Coast Region, (2) retain all ballast water on board, (3) discharge the ballast water to a reception facility approved by the CSLC or (4) use an alternative, environmentally sound method of ballast water management that has been approved by the CSLC or the USCG. "Near-coastal waters" are defined in Article 4.6 as those waters that are more than 50 nm from land and at least 200 meters (656 feet) deep. "Pacific Coast Region" is defined in Article 4.6 as all estuarine and ocean waters within 200 nm of land or less than 2,000 meters (6,560 feet, 1,093 fathoms) deep, and rivers, lakes or other water bodies navigably connected to the ocean on the Pacific Coast of North America east of 154 degrees west longitude and north of 25 degrees north latitude, exclusive of the Gulf of California.

The Coastal Ecosystem Protection Act (SB 497, 2006) required the state to adopt ballast water performance standards by January 2008 and sets specific deadlines for the removal of different types of species from ballast water applies to all commercial vessels.

In July 2004, the U.S. Coast Guard promulgated new regulations that establish a mandatory ballast water management program (33 CFR Part 151), which includes one of three acceptable ballast water management practices, for all vessels equipped with ballast water tanks that enter or operate within U.S. waters. These regulations also require vessels to maintain a ballast water management plan that is specific for that vessel.

Hazardous Materials

Various hazardous materials are used and hazardous wastes are generated during the course of vessel operations. For example, hazardous wastes generated on cruise ships include dry cleaning and photo processing chemicals, paints and solvents, batteries, and fluorescent light bulbs containing mercury. These substances can be toxic or carcinogenic to marine life. The Resource Conservation and Recovery Act (RCRA) requires that vessels that generate or transport hazardous waste offload these wastes at treatment or disposal facilities (NOAA 2003c, 2003d, 2003e). See Section 3.8 for further discussion on hazardous waste and treatment facilities.

Solid Wastes

Solid wastes generated by vessels include food waste, cans, glass, wood, cardboard, paper, and plastic. The discharge of solid wastes is regulated under Act to Prevent Pollution from Ships (APPS) and CWA. The Marine Plastic Pollution and Control Act regulates the disposal of plastics and garbage pursuant to Annex V of MARPOL. Under these regulations the disposal of plastics is prohibited in any waters, and floating

dunnage[2] and other materials are prohibited in navigable water within twenty-five nm from land. Other garbage, such as food waste, paper and metal, can be disposed of beyond 25 nm from shore. Garbage ground to pieces under an inch can be discharged beyond 3 nm from shore.

Cruise Ships

Cruise ships generate domestic wastewater and other by-products during the course of their daily operations. The most common domestic wastes are sewage, or "black water," which is human waste from toilets and urinals, plus medical facility sink drainage, and "gray water," which is typically galley, laundry, bath/shower, and sink drainage. The volume of discharges from large cruise ships is of particular concern in the sanctuaries. Cruise ships regularly transit sanctuary waters and embark at ports within the San Francisco and Monterey bays. Between 2002 and 2004, the number of cruise ships that made ports of call in California increased by 50 percent (Bluewater Network 2004). Currently 650,000 cruise ship passengers embark annually from California ports in San Francisco Bay, Los Angeles, and San Diego (SWRCB 2003). Approximately 90 cruise ship arrivals and departures are estimated at the San Francisco Passenger Terminal in 2006. Although partly constrained by the lack of local docking facilities, cruise ship visits to the area are likely to continue to grow as the fleet shifts from international to more domestic cruises, and due to a new cruise ship docking facility planned in San Francisco Bay.

Cruise ships generate large volumes of waste and may have significant impacts on the marine environments they transit through. Large cruise ships can generate as much as 41,640 cubic meters (eleven million gallons) of waste per day (NOAA 2003c, 2003d, 2003e). The typical storage capacities for cruise ships are as follows: gray water—500-2100 tons, black water—400-1,000 tons, and bilge water—60-300 tons.

While large cruise vessels are the equivalent of small cities in regard to waste production, they are not subject to the strict environmental regulations and monitoring requirements that land based facilities are required to comply with, such as obtaining discharge permits, meeting numerous permit conditions and conducting monitoring of discharges. Only recently have cruise ship discharges been prohibited in California state waters (water located within three miles of the California coastline). This legislation, however, does not afford protection to sanctuary waters outside of California state water boundaries. The main pollutants generated by a cruise ship include sewage, gray water, bilge water, ballast water, hazardous waste, and solid waste. Each of these pollutants is defined above in the vessel discharges discussion. Specific information regarding cruise ship discharges is summarized below.

Sewage

Volumes of sewage for a typical cruise ship have been estimated at between five to ten gallons per person per day, or up to 210,000 gallons per week (State of California Legislature*, Assembly Bill 906*). Sewage is classified as a pollutant under the CWA. However, cruise ships are not subject to the National Pollutant Discharge Elimination System (NPDES) Permitting Program, which requires land-based facilities to obtain a permit for discharges under the CWA. Black water from cruise ships is regulated under Section 312 of the CWA (33 U.S.C. § 1322), which requires vessels to possess a US Coast Guard certified MSD, as described above. Most cruise ships use Type II MSDs. It is important to note that although these systems were designed to meet CWA Section 312 standards; in reality monitoring has shown that the systems often do not operate properly. In fact, studies have shown that conventional MSDs often fail to meet federal standards for discharge. The results of a study conducted by the Alaska Department of Environmental Conservation in 2000 show that in

[2] Loose packing material used to protect a ship's cargo from damage during transport

approximately 55 percent of the cruise ships tested, the fecal coliform count in treated black water was not in compliance with the federal standard of 200 fecal coliform per 100 milliliter (State of Alaska Department of Environmental Conservation 2000). A recent California law, Assembly Bill (AB) 2672, prohibits the discharge of treated or untreated sewage from cruise ships into state waters (from the shoreline to 3 nm offshore).

Graywater

A typical cruise ship produces between 90,0000 and 180,000 gallons of graywater per week (SWRCB 2003). Currently, federal regulations under the CWA do not prohibit the discharge of graywater in state or U.S. waters, with the exception of the Great Lakes and the state waters of Alaska. A recent California law, AB 2093, prohibits the discharge of graywater from cruise ships into state waters (from the shoreline to 3 nm [3.5 miles; 5.5 km] offshore).

Bilge Water

A typical cruise ship generates an estimated 25,000-35,000 gallons of bilge water per week (Ocean Conservancy 2002). Discharge of fuel or oil, including oily bilge water, is subject to stringent requirements of the Oil Pollution Act and Section 311 of the CWA (33 U.S.C. § 1321), as described above. Several cruise line companies require their vessels to have additional equipment that treats the oily bilge water to 5 ppm. Discharge of oily wastes is also addressed under the International Convention for the Prevention of Pollution from Ships (MARPOL), and under the APPS, which incorporates MARPOL provisions into federal law. They set requirements for the release of oil and noxious substances, set standards for reporting discharges, and establish monitoring and record keeping protocols.

In general, oil waste is generated during normal ship operations; oily water discharges exceeding specified limits are frequently the result of an improperly operating oil-water separator (OWS) or emergency bilge pumping, and inadvertent discharge of bilge water, but purposeful discharges of bilge water have occurred (US Department of Justice 2004). In addition, as a result of collisions, groundings, fueling spills, or bilge pumping required by flooding, significant quantities of oil may be discharged.

With regard to oil discharge, the MBNMS oil discharge prohibition has been interpreted to mean any detectable or trace discharge of oil is illegal, even if it meets the USCG standards of 15 ppm. Today's cruise ships have systems capable of treating bilge to meet these standards and can reach levels as low as 5 ppm (NOAA 2005a).

Ballast Water

Like other large vessels, cruise ships take in large volumes of ballast water, in order to stabilize the vessel for safe and efficient operation. During the process they take in thousands of species of marine organisms, including various types of larvae, fish eggs, and microorganisms. The water is often drawn in from coastal waters in one area, and discharged at another location. Unlike cargo vessels, cruise ships do not significantly change their loading while in port and are not likely to exchange ballast water there; however, they may pump ballast water when fueling. They do frequently travel near the coast and can be carrying hundreds of thousands of gallons of ballast water at a time.

In July 2004, the U.S. Coast Guard promulgated new regulations that establish a mandatory ballast water management program (33 CFR Part 151), which includes one of three acceptable ballast water management practices, for all vessels equipped with ballast water tanks that enter or operate within U.S. waters. These regulations also require vessels to maintain a ballast water management plan that is specific for that vessel.

California has several regulations regarding ballast water that are relevant to cruise ships. The Marine Invasive Species Act (AB 433, 2003) and the California Code of Regulations Title 2, Division 3, Chapter 1, Article 4.6 (2005) contain specific ballast water discharge requirements applicable to all vessels, including cruise ships, weighing 300 gross registered tons or more. The Coastal Ecosystem Protection Act (SB 497, 2006) requires the State to adopt ballast water performance standards by January 2008 and sets specific deadlines for the removal of different types of species from ballast water applies to all commercial vessels.

Hazardous Materials

Hazardous wastes produced on cruise ships include by-products of dry cleaning and photo processing operations, paints and solvents, batteries, fluorescent light bulbs containing mercury, and wastes from print shops. A typical ship produces an estimated 110 gallons of photo processing chemicals, five gallons of dry cleaning wastes, and ten gallons of used paints per week.

Solid Wastes

A typical cruise ship generates 50 tons of solid waste per week (Ocean Conservancy 2003). In some cases the wastes are incinerated on the vessel and the ash is discharged at sea; other wastes are disposed of on shore or recycled. Cruise ships from most countries do not dispose of plastics anywhere at sea. Guidelines from MARPOL ban the dumping of plastic. Solid waste discharges can cause environmental impacts, such as increased nutrients.

Cruise Ship Discharge Practices

The cruise line industry has a history of discharge violations, including violations for illegal discharges and for not meeting MSD performance standards identified in the CWA. At the same time, certain cruise line companies have taken voluntary pollution reduction measures, such as requiring their vessels to have equipment that treats the oily bilge water above regulatory requirements to 5 ppm (NOAA 2003c, 2003d, 2003e). Some cruise lines have even adopted a "no discharge in marine protected areas" policy where they hold all discharges until they are outside their boundaries. Within MBNMS, three cruise lines voluntarily adopted a no discharge policy. Subsequently, in 2004, prompted by a cruise ship discharge incident in October 2002 that released approximately 130 cubic meters (34,000 gallons) of graywater into MBNMS, the State of California passed legislation to limit the water and air pollution generated by cruise ships in California waters (AB 471, AB 2093, and AB 2672).

Because of the growing concerns associated with cruise ship discharges, in addition to the proposed regulatory action being considered in this EIS, actions have been taken on the national and regional levels to address the real or perceived threats from cruise ships. The following recent actions are relevant to the three-sanctuary study area.

- Two California state bills, AB 2093 and AB 2672 became effective in January 2005, that prohibit the discharge of graywater, hazardous materials, oily bilge water and black water (sewage) into state waters, and set up notification protocols for release of these substances into state waters or waters of a national marine sanctuary;
- Petitions from Bluewater Network (a coalition of environmental organizations) were submitted to USEPA and NOAA to examine the impacts of cruise ship discharges in U.S. waters or to prohibit them in NMSs, respectively;

- The City of Monterey now requires each vessel that anchors in Monterey to sign a written contract, in which the vessel agrees to withold all discharges (except engine cooling water) while operating within the boundaries of the sanctuary. If this agreement is not abided by, the vessel will be banned, in perpetuity, from using the City's facilities to offload passengers, and the cruise line to which the vessel belongs will be banned for 15 years.
- Crystal Cruise Line was banned from Monterey Harbor in 2003 for 15 years, after one of its ships violated voluntary agreements with the Sanctuary and the City of Monterey by discharging sewage, graywater, and treated bilge water within the Sanctuary.

Motorized Personal Watercraft

Among the concerns regarding vessel impacts on water quality is the use of MPWC in limited nearshore areas. The majority of MPWC operated within the sanctuaries are compact water jet-propelled craft that shed water from the passenger spaces. Larger models are most commonly used in the ocean environment for their power, range, and towing ability. MPWC are used especially in the surf zone, including to tow surfers into large waves at Mavericks, a surf break off Pillar Point in San Mateo County. Based upon reports from harbormasters and NOAA enforcement personnel, the Sanctuary estimates that approximately 1200 MPWC trips were conducted in MBNMS in 2002. This number represents repeat trips by an estimated total of 150 MPWC. MPWC use has increased significantly in some areas since that time due to the growing popularity of tow–in surfing. NOAA estimates that 80-90 percent of MPWC operated in the Sanctuary seat three or more people.

Water quality concerns related to use of MPWC include the discharge of unburned fuel into the water while engines are running and the release of hydrocarbons from oil and gasoline tanks in flipping incidents. The contaminants of concern include methyl tertiary butyl ether (MTBE), an oxygenate added to gasoline, and polycyclic aromatic hydrocarbons (PAHs), by-products of the combustion process (Bluewater Network 2004; NPS 2000). Since MPWC within MBNMS are often operated in close proximity to nearshore reefs and exposed rocks, MPWC sometimes impact these formations and break up, scattering vessel debris into surrounding waters.

Spill Incidents

There is a persistent threat to water quality from an accidental spill from a vessel within or outside the sanctuaries' boundaries. Offshore spills, particularly near high-use shipping lanes, have the potential to severely impair water quality. In the event of an oil spill, the impact on the sanctuaries would depend on the spill location and the wind and sea conditions (NOAA 2003c, 2003d, 2003e).

Historic Dumping

Hundreds of millions of tons of hazardous and nonhazardous waste historically have been dumped on the continental shelf and slope in the sanctuaries, particularly outside of the San Francisco Bay. These wastes include dredged sediments; industrial wastes from oil refineries, steel production, and other sources; munitions and ships from World War II; unwanted and capsized vessels; and barrels of low-level radioactive waste. Many ships are scattered on the seafloor of the sanctuaries, although most are not sources of hazardous contamination. Notable exceptions to this include the USS *Independence*, a highly radioactive ship that was probably disposed of in the vicinity of the Gulf of the Farallones (exact location unspecified), and the SS *Puerto Rican*, part of which sank with a load of 8,500 containers of oil south of the Farallon Islands (Chin and Ota 2001). The latter vessel is reported to continue to leak oil into the marine environment.

Dredged sediments have been disposed of in the sanctuaries since at least 1959, much of this from dredging activities in the San Francisco Bay and its entrance, and some from specific projects, such as the excavation of the Trans-Bay Tube for Bay Area Rapid Transit. Between 1946 and 1970, nearly 50,000 containers of low-level radioactive waste were disposed of west and south of the Farallon Islands. All of these historic dumping practices may have impacted, and may continue to impact, water quality in the sanctuaries (Chin and Ota 2001).

Dredge Disposal

There are four dredge disposal sites in MBNMS (see Figure 2-5). None have been identified in either GFNMS (the interim dumpsite referenced in the GFNMS 1981 DEIS is no longer in service) or CBNMNS; however, the San Francisco Deep Ocean Disposal Site (SF-DODS) is located approximately 25 nm west of the Farallon Islands, and approximately 10 nm west of the western boundary of GFNMS. This site is used for the disposal of uncontaminated material generated during dredging activities in the San Francisco Bay. Annual dumping volumes at SF-DODS vary from year to year; volumes ranged from 50,000 cubic yards to 3,400,000 cubic yards between 1995 and 2001 (USACE 2002b).

There are four major harbors adjacent to MBNMS. Two of these harbors (Santa Cruz and Moss Landing) regularly dredge the bottom of the harbor and dispose of the bulk of their dredge sediments within MBNMS. Harbors dispose of their dredged material either in the ocean, on land at landfill sites, or at designated beach nourishment sites adjacent to the harbors. When MBNMS was designated in 1992, two existing offshore sites for dredge disposal were identified (SF-12 and SF-14), and the establishment of new sites was prohibited within its boundaries.

The SF-12 dredge material disposal site is located approximately 50 yards off the beach near Moss Landing Harbor at the head of the Monterey Canyon; material is generally piped from the dredge site inside the harbor out to the disposal site. Moss Landing Harbor has disposed of 38,000 to 115,000 cubic meters (50,000 to 150,000 cubic yards) of dredge material per year at SF-12 or at the Marina landfill, which is used for dredge material not suitable for aquatic disposal. The SF-14 dredge material disposal site is a deepwater site approximately 3.7 km (two nm; 2.3 miles) west of Moss Landing Harbor; this site is very rarely used due to the need for a barge and the associated expense of that disposal method.

There has been some confusion among agencies about the exact location of dredge material disposal site SF-12 near Moss Landing. Many of the stated locations for this site have not been consistent with the historical location of discharge due to changes in the pier terminus and the proximity of the head of the canyon from the shoreline.

MBNMS has recognized and authorized the use of two additional disposal sites at Santa Cruz and Monterey harbors since these sites were in use and permitted by other agencies prior to designation:

- **Twin Lakes State Beach (Santa Cruz Harbor).** In 1997, the Sanctuaries and Reserves Division of the Office of Ocean and Coastal Resource Management approved the recognition of the surf zone area off Twin Lakes State Beach as a legal disposal site for clean sandy material from the Santa Cruz Harbor. This site was in existence prior to the designation of MBNMS. Only material that complies with CWA Section 404(b)(1) may be disposed of at this site, and disposal activities must comply with all MBNMS regulations, including being conducted under a valid permit issued by USACE.

Use of the dredge disposal site at Santa Cruz has resulted in water column turbidity, which varies depending on oceanographic conditions. Disposal during high-energy oceanic conditions may result in increased nearshore turbidity, whereas disposal during low energy conditions can lead to sedimentation and mounding in the disposal area.

- **Monterey Harbor**. In 2000, the Sanctuaries Division of the Office of Ocean and Coastal Resource Management recognized a historical dredge material disposal site east of Municipal Wharf II next to Monterey Harbor. This site was in existence prior to the designation of MBNMS and is used on a very limited basis. Use of the dredged material disposal site is considered when sediments are tested and shown to be suitable for unconfined aquatic disposal according to Section 404 of the CWA.

Santa Cruz Harbor is permitted to dispose of 268,000 cubic meters (350,000 cubic yards) of clean, sandy material from the entrance channel on an annual basis. An additional 7,650 cubic meters (10,000 cubic yards) of material, of which 2,300 cubic meters (3,000 cubic yards) may consist of fine grain sand and silt, may be disposed. The harbor disposes of this dredged material in the subtidal area adjacent to Twin Lakes State Beach, above mean high water at Twin Lakes State Beach, and at the Marina landfill. The Monterey Harbor has dredged approximately 3,060 cubic meters (4,000 cubic yards) of material on a sporadic basis in recent years. Monterey Harbor has occasionally made use of the historic dredge disposal area adjacent to Wharf 2, the area above mean high tide for beach replenishment, and the Marina landfill. Pillar Point Harbor historically has had little need for dredging (Hall 2004).

Disposing of dredged material in the ocean adversely impacts the marine environment by increasing water column turbidity.

3.5.2 Regulatory Environment

The water quality of the sanctuaries is regulated by a number of statutes and government agencies. These serve to protect the marine environment from the various point and nonpoint sources of marine pollution. Regulations applicable to the various types of cruise ship discharges are described above in the affected environment discussion of cruise ship discharges.

Federal Water Pollution Control Act, commonly known as the Clean Water Act, 33 U.S.C. § 1251 et seq.

The CWA was passed in 1972 by Congress, and substantially amended in 1987. Under CWA Section 402 (33 U.S.C. § 1342), any discharge of a pollutant from a point source (e.g., a municipal or industrial facility) to the navigable waters of the United States or beyond must obtain an NPDES permit, which requires compliance with technology- and water quality-based treatment standards. Two sections of the CWA deal specifically with discharges to marine and ocean waters. Under CWA Section 403 (33 U.S.C. § 1343), any discharge to the territorial seas or beyond also must comply with the Ocean Discharge Criteria established under CWA Section 403.

CWA Section 312 (33 U.S.C. § 1322) contains regulations protecting human health and the aquatic environment from disease-causing microorganisms that may be present in sewage from boats. An MSD is equipment on board a vessel designed to receive, retain, treat, control, or discharge sewage, and any process to treat such sewage. Pursuant to Section 312 of the CWA, all recreational boats with installed toilet facilities must have an operable MSD on board. Vessels 20 meters (65 feet) and under may use a Type I, II, or III MSD. Vessels over 20 meters (65 feet) must install a Type II or III MSD. All installed MSDs must be Coast

Guard-certified. Coast Guard-certified devices are so labeled except for some holding tanks, which are certified by definition under Section 312 of the CWA (33 U.S.C. § 1322).

CWA Section 316 (33 U.S.C 1326) regulates thermal discharges from power plants. Section 316(a) limits thermal effluent in order to assure the protection and propagation of balanced, indigenous aquatic communities. Section 316(b) regulates cooling water intake structures in order to minimize adverse impacts to the aquatic environment.

Title I of the Marine Protection, Research, and Sanctuaries Act, also known as the Ocean Dumping Act, 33 U.S.C. §§ 1401-1445

The Marine Protection, Research, and Sanctuaries Act (MPRSA) regulates the dumping of wastes into marine waters. It is the primary federal environmental statute governing transportation of dredged material for the purpose of disposal into ocean waters, while CWA Section 404 governs the discharge of dredged or fill material into waters of the US. In 1983, a global ban on the dumping of radioactive wastes was implemented. The MPRSA and the CWA regulate materials that are disposed of into the marine environment, and only sediments determined to be nontoxic by USEPA standards may be disposed of into the marine environment. The USEPA and the USACE share responsibility for managing the disposal of dredged materials (Chin and Ota 2001).

Oil Pollution Control Act, 33 U.S.C. § 2701 et seq.

The Oil Pollution Control Act of 1990 requires extensive planning for oil spills from tank vessels and onshore and offshore facilities and places strict liability on parties responsible for oil spills.

Act to Prevent Pollution from Ships, 33 U.S.C. § 1901 et seq.

The discharge of solid wastes is regulated under the APPS, as amended by the Marine Plastic Pollution Research and Control Act of 1987, and the CWA. The APPS regulates the disposal of plastics and garbage for the United States Annex V of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78). Under these regulations the disposal of plastics is prohibited in all waters, and other garbage, including paper, glass, rags, metal, and similar materials, is prohibited within 22 km (twelve nm; 14 miles) from shore (unless macerated). Under the current regulations, disposal of much of the solid waste generated by vessels is allowed in areas within the marine sanctuaries beyond 22 km from the shore (NOAA 2003c, 2003d, 2003e).

Coastal Zone Management Act, 16 U.S.C. §§ 1451-1466

The Coastal Zone Management Act (CZMA) provides incentives for coastal states to develop and implement coastal area management programs. It is significant with regards to water pollution abatement, particularly concerning nonpoint source pollution.

Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§ 9601 - 9675

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) addresses cleanup of hazardous substances and mandates liability for environmental cleanup on those whose actions cause release into the environment. In conjunction with the CWA, it requires preparation of a National Contingency Plan for responding to oil or hazardous substances release.

Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901-6992k

The RCRA addresses hazardous waste management, establishing duties and responsibilities for hazardous waste generators, transporters, handlers, and disposers.

Porter-Cologne Water Quality Control Act, California Water Code §§ 13000-14958

The Porter-Cologne Water Quality Control Act contains provisions for enforcing water quality standards through issuance of Waste Discharge Requirements. Pursuant to the act, the SWRCB has the primary responsibility to protect California's coastal and ocean water quality. SWRCB has been given the authority by the USEPA to administer the NPDES program for California. The Regional Water Quality Control Boards, in coordination with the SWRCB, issue both state waste discharge requirements and NPDES permits to individual dischargers. Dischargers are required to establish self-monitoring programs for their discharges and to submit compliance reports to Regional Water Quality Control Boards. The SWRCB has established regulations to implement these measures through water quality control plans, including the California Ocean Plan (Ocean Plan), the Regional Water Quality Control Plans (Basin Plans), and the Thermal Water Quality Control Plan (California Ocean Resources Management Program 1995).

California Public Resources Code

California recently enacted legislation (Assembly Bills 2093 and 2672) to mandate stricter pollution prevention from cruise ships. One of the new laws (AB 2093) prohibits the discharge of graywater from cruise ships into state waters, and the other (AB 2672) prohibits the discharge of treated or untreated sewage from cruise ships into state waters. These amendments are significantly more stringent than federal regulation of cruise ships and also provide the strongest state protections from cruise ship pollution in the United States.

California Coastal Act, Cal. Pub. Res. Code § 30000 et seq.

The California Coastal Act of 1976 mandates protections for terrestrial and marine habitat through its policies on visual resources, land development, agriculture, commercial fisheries, industrial uses, water quality, offshore oil and gas development, transportation, power plants, ports, and public works. The Coastal Commission administers various programs, including Local Coastal Programs and the Water Quality Program, which facilitates the interagency Nonpoint Source Pollution Control Program.

California Marine Invasive Species Act, AB 433

The California Marine Invasive Species Act of 2003 mandates the management of ballast water. The act reauthorized and improved upon the California Ballast Water Management and Control Act (AB 703). It requires mid-ocean exchange or retention of ballast water for vessels coming from outside the EEZ and requires vessels coming from other west coast ports to minimize ballast water discharge. Record-keeping and other compliance measures apply to all vessels entering California waters. As of March 22, 2006, all vessels must exchange ballast water when traveling between one port or place and another in the Pacific Coast Region.

California Clean Coast Act

The California Clean Coast Act, which became effective on January 1, 2006, prohibits the release from large passenger vessels (cruise ships) and other oceangoing ships (300 gross tons or more) of hazardous waste, oily bilge water, other waste, and sewage sludge into the marine waters of the state and marine sanctuaries. The Clean Coast Act also prohibits the release of graywater from cruise ships and oceangoing ships with sufficient holding capacity into the marine waters of the state. Furthermore, the Clean Coast Act requires the State

Water Resources Control Board to request the appropriate federal agencies to prohibit the release of wastes from cruise ships and oceangoing ships into state marine waters and the four National Marine Sanctuaries offshore of California.

3.5.3 Significance Criteria and Impact Methodology

Criteria to determine the significance of water quality impacts are based on federal, state, and local water quality standards and regulations. Impacts are considered to be significant if a proposed action would:

- Alter the bacterial, physical, or chemical characteristics of near-shore ocean waters (not including enclosed bays or estuaries) so that they exceed effluent limitations established under the California Ocean Plan;
- Alter the bacterial, physical, or chemical characteristics of bay or estuary waters so that they violate requirements or exceed effluent limitations established by the Basin Plans for the North Coast and the San Francisco Bay Regional Water Quality Control Board;
- Result in ocean discharges not allowed for by a NPDES permit, or which do not meet discharge criteria established under the CWA
- Conflict with guidelines provided for by the Nonpoint Source Pollution Control Program's Management Measures; or
- Otherwise violate the CWA, the MPRSA, the Oil Pollution Control Act, the APPS, the CZMA, CERCLA, RCRA, the Nonindigenous Aquatic Nuisance Prevention and Control Act, the Porter-Cologne Water Quality Control Act, new state legislation on cruise ship dumping of graywater and sewage, the California Coastal Act, California Marine Invasive Species Act, or any National Marine Sanctuary program policies.

The methodology used to determine whether a proposed or alternative action would have a significant impact on water quality is as follows:

- Review and evaluate existing and past baseline activities to identify the action's potential to impact water quality;
- Review and evaluate each proposed action and alternative to identify the action's potential to increase marine pollution or otherwise impact water quality within the sanctuaries; and
- Assess the compliance of each proposed action with applicable federal, state, or local water quality regulations, guidelines, and pollution prevention measures.

The overall methodology, including data sources and assumptions, used to conduct the water quality impact evaluation is consistent with the NOAA NEPA guidelines (NOAA 216-6).

3.5.4 Cross-Cutting Regulations – Environmental Consequences

The cross-cutting regulations identified in Table 2-1 include nearly identical changes to the regulations in all of the three sanctuaries.

The Proposed Action

Introduced Species

The proposed regulation would prohibit the release of introduced species into the three sanctuaries. Introduced species have the potential to alter ecosystem composition and function, and their introduction can indirectly impact water quality. An example of a non-native species affecting water quality is the Asian clam (*Corbula amurensis)*, in the San Francisco Bay Estuary. This species concentrates selenium at a much higher rate than any native species, negatively affecting higher trophic organisms that can bioconcentrate this contaminate. Oil refineries in the region have spent large sums of money extracting selenium from the ecosystem (SFBRWQCB 2000). Large scale invasions of introduced species, such as what has occurred in the Great Lakes with zebra mussels, have proven that introduced species can successfully displace indigenous species and significantly alter entire ecosystems. In that case, the proliferation of zebra mussels throughout the Great Lakes resulted in dramatic changes in water quality (and the chemical make-up of the water), which in turn affected invertebrate and fish species composition and overall population structures.

Diseases carried by introduced species can also affect water quality. Moreover, introduced species can arguably be treated as biological pollutants, consistent with the CWA (Section 502[6]). The USEPA regulates biological pollutants under various programs of the CWA, and biological control, the use of one organism to control the population size of another organism, is seen as one of the principles of water quality control. Pathogens are treated as biological pollutants for their deleterious impacts on aquatic wildlife, and introduced species may be viewed similarly for their ability to alter and disturb marine ecosystems (SFBRWQCB 2000).

Prohibiting the introduction of non-native species to the sanctuaries under the Proposed Action would provide future beneficial impacts on the water quality of the region. This regulation may prevent the future introduction of harmful species and would provide for a variety of water quality protections, by reducing the amount of biological pollutants entering the water column.

Discharge Regulation Clarifications

The proposed new and modified regulations would provide clarifications to the existing regulations and narrow the range of allowable discharges. The following are proposed for CBNMS, GFNMS and MBNMS sanctuaries: 1) clarify the discharges from within or into (emphasis added) the sanctuaries that are prohibited; 2) clarify that exceptions to discharge rules for fish parts, chumming materials, or bait are allowed only as a result of "lawful fishing activity"; 3) remove the discharge/deposit exception for wastes resulting from meals onboard vessels, and 4) clarify that only "clean" material or other matter resulting from deck wash down, vessel engine and generator cooling water and anchor wash are allowable. All sanctuaries will continue to interpret their existing discharge/deposit regulations as prohibiting the discharge ballast water and oily wastes from bilge pumping.

Each of the proposed new and modified prohibitions under the Proposed Action would provide greater protections to the sanctuaries' waters by reducing the volume of a variety of pollutant discharges identified in Section 3.5.1. Therefore, these proposed regulatory changes would have potential beneficial future impacts on the water quality of the sanctuaries.

Discharge – Exceptions - Marine Sanitation Devices and Graywater

Large vessels (300 gross tons) would no longer be permitted to discharge or deposit treated sewage, and graywater in the MBNMS, into the sanctuaries. These regulations would reduce potential impacts from these

vessels on the marine environment. The prohibition would reduce the quantity of anthropogenic discharges, most of which contain some amount of harmful pollutants, into the sanctuaries. By reducing harmful discharges, the Proposed Action would have potential beneficial future impacts on water quality in the sanctuaries.

For smaller vessels (less than 300 gross tons), NOAA proposes to clarify its regulations requiring the use of Type I or II MSD devices throughout the sanctuaries' waters. The clarification would make it understood that use of a Type III MSD is allowed but that discharge from a Type III MSD (a holding tank of untreated sewage) is prohibited in the sanctuaries. Additionally, the proposed regulation of requiring locks on valves preventing bypass and direct discharge of untreated sewage is meant to facilitate enforcement of this regulation by the Coast Guard to prevent accidental discharge.

The clarification of the existing regulations regarding MSDs may increase compliance and enforceability and reduce unintentional violations relating to the use of marine sanitation devices in the sanctuaries. This may result in a decrease in the discharge of raw sewage from vessels, which would benefit water quality by reducing fecal coliform bacteria, pathogens, viruses, and other pollutants in the marine environment. Since the Proposed Action has the potential to reduce the quantity of sewage discharge into the sanctuaries, it would have potential significant beneficial future impacts on water quality in the sanctuaries.

Cruise Ship Discharges and Definitions

The proposed regulations would limit cruise ship discharges in the sanctuaries to clean vessel engine cooling water, generator cooling water, and anchor wash. Cruise ships in the sanctuaries would no longer be permitted to discharge biodegradable effluents, deck wash, treated wastewater, or any other materials other than those waters named above into the sanctuaries. This regulation would greatly reduce potential impacts from cruise ships on the marine environment, including impacts resulting from sewage, graywater, oily bilge water, and ballast water. Monterey had 21 large cruise ship visits in 2004 (NOAA 2005a) and San Francisco was port to approximately 83 cruise ships in 2005. Given that large cruise ships can generate as much as eleven million gallons of waste per day, the Proposed Action has the potential to greatly reduce the quantity of anthropogenic discharges, most of which contain some amount of harmful pollutants, into the sanctuaries. By reducing harmful discharges, the Proposed Action would have potential significant beneficial future impacts on water quality in the sanctuaries.

Alternative Regulatory Actions

Cruise Ship Prohibition Alternative

This alternative would reduce (compared to existing conditions) the amount of harmful discharge that could pollute the marine environment and result in beneficial impacts on water quality. However, it would not achieve the same beneficial effects as described for the Proposed Action. This provision would allow cruise ships to discharge properly treated effluent so long as it can be shown to be in compliance with water quality standards established by the US Coast Guard and USEPA in Alaska (33 CFR 159, Subpart E). Such proof would comprise a discharge plan with associated maintenance logs, approved by NMSP prior to entry into the sanctuaries. This alternative is intended to have similar impacts on water quality as the Proposed Action; however as noted above, some MSDs do not achieve the effluent standards they are designed to meet (State of Alaska Department of Environmental Conservation 2000). Furthermore, there are concerns that the 33

CFR 159 regulations have inadequate provisions regarding monitoring and enforcement. [3] Therefore, it is likely that discharge of cruise ship wastewater into the sanctuaries under this alternative could result in fewer beneficial impacts on water quality than the Proposed Action, despite being conducted under an approved discharge plan. In addition, this alternative would require more staff time, from both NOAA and the industry, to implement, monitor, and enforce compliance with the discharge standards. Given additional administrative costs of implementing this alternative, this alternative may not be feasible and is not environmentally preferred from a water quality perspective.

The No Action Alternative

Under the No Action alternative, the additional protections from introduced species and vessel discharges identified above would not be implemented. Continued discharge into the sanctuaries would likely result in an ongoing less than significant adverse impact on water quality.

3.5.5 Cordell Bank National Marine Sanctuary – Environmental Consequences

There are no proposed regulations unique to CBNMS that would have substantive impacts on water quality. Proposed regulations regarding seabed and benthic habitat protection may have negligible benefits on water quality, by preventing future activities that could disturb the seabed and cause localized turbidity. However, there are no such activities taking place now and any beneficial effect would be extremely minor.

3.5.6 Gulf of the Farallones National Marine Sanctuary – Environmental Consequences

The Proposed Action

Deserted Vessels

The proposed regulation would prohibit vessels from being deserted in the Sanctuary. Additionally, a related proposed regulation would prohibit leaving harmful matter (hazardous materials or wastes) aboard either a grounded or a deserted vessel. These two regulations would help reduce future impacts on water quality from vessel stranding or grounding incidents and minimize the potential for harmful matter, such as oil, gasoline, and marine debris, to spill into waters from deserted vessels. As such, these regulations would have potential beneficial future impacts on water quality in the sanctuaries.

Water Quality – Discharges From Outside the Sanctuary

The proposed regulation would prohibit discharging or depositing any material or other matter from beyond the boundary of the Sanctuary that subsequently enters the Sanctuary and injures a Sanctuary resource or quality. This regulation proposes the same exceptions as the cross-cutting "discharge within or into the Sanctuary" regulation and would have similar benefits to water quality as those described in section 3.5.4 for the cross-cutting discharge regulation clarifications. In addition, the Proposed Action would help reduce or eliminate potentially harmful pollutants such as oil, sewage and other hazardous chemicals from entering the sanctuaries and causing injury to Sanctuary resources or qualities. Potential upland sources of pollution include municipal wastewater outfalls, industrial outfalls, surface runoff (nonpoint source pollution), and oil and hazardous materials spills. Some examples of marine based sources of pollution include discharges from transiting and wrecked ships, and underwater pipelines). This regulation would result in potential direct

[3] Rather than relying solely on the provisions of 33 CFR 159, the state of Alaska passed a ballot initiative in 2006, which established additional more restrictive discharge conditions under a new Commercial Passenger Vessel Environmental Compliance Program. The program includes a broad range of compliance measures. The costs to the state of administering the new program are covered by a berth tax that was part of the ballot initiative.

beneficial impacts on water quality, by minimizing or reducing the likelihood of potentially harmful or toxic spills or discharges that could impair and degrade Sanctuary water quality.

Oil and Gas Pipeline Clarification

The proposed regulation would limit pipelines going through the Sanctuary to those associated with facilities located adjacent to the Sanctuary rather than from any offshore oil and gas facility located outside the Sanctuary. This change would reduce the potential for water quality impacts from pipeline construction, and reduce risk of oil or gas spills or other materials being deposited into Sanctuary waters. Reducing the risk of discharge of harmful matter into the marine environment would result in a beneficial impact on water quality in the Sanctuary.

No-Anchoring Seagrass Protection Zones

Seagrass beds serve as natural buffer zones in protecting against coastal erosion caused by storms and wave action, thereby maintaining sediment stability and water quality. Seagrass also serves as a filter for pollutants carried downstream through the watershed by trapping sediments and nutrients. This filtering effect contributes to improved water quality in the nearshore environment, particularly in sensitive estuarine environments and embayments.

Vessel anchoring in seagrass can have both direct and indirect effects on water quality. The physical act of anchoring in soft sediment can cause localized turbidity, which decreases water quality in the immediate vicinity of the seagrass. This direct effect on water quality is usually short term and localized, however seagrass is very sensitive to changes in water quality and could be impacted by continued turbidity caused by anchoring. Turbity clouds the photic zone, thus limiting the growth of seagrass. Long term impacts can result when anchoring disturbs the seabed, creating a scar that can be deepened by wave action and associated erosion. This scarring can reduce the size of seagrass beds, thus reducing the ability of the seagrass to function as a sediment stabilizer and water column filter.

By prohibiting anchoring a vessel in a designed seagrass protection zone in Tomales Bay, the potential for adverse anchoring effects described above would be reduced or eliminated in the zones. Therefore, the proposed regulation would result in both short- and long-term beneficial effects on nearshore water quality.

Alternative Regulatory Actions

There are no regulatory alternatives for GFNMS that would have any discernable impacts on water quality.

The No Action Alternative

The No Action alternative would continue to manage the Sanctuary as it is currently managed, and no additional protections from deserted vessels and discharges from beyond the Sanctuary boundaries would be provided. The No Action alternative would maintain the status quo and would not provide the Sanctuary with enhanced protections for water quality.

3.5.7 Monterey Bay National Marine Sanctuary – Environmental Consequences

The Proposed Action

Deserted Vessels

As in GFNMS, the proposed regulation would prohibit vessels from being deserted in the Sanctuary and would prohibit leaving harmful matter (hazardous materials or wastes) aboard a deserted vessel. These proposed prohibitions would have the same potential beneficial impacts on water quality, as described for GFNMS.

Davidson Seamount

Incorporating Davidson Seamount into the boundaries of MBNMS would increase protection of water quality around the seamount by applying both existing sanctuary discharge regulations and proposed discharge prohibitions analyzed in other sections of this FEIS. Although current discharge practices are not a known concern in the seamount area, the inclusion of the seamount in the sanctuary would ensure that any future uses would not contribute to water quality degradation. Limiting the types of discharge in the seamount area would result in a minor beneficial effect on water quality.

Motorized Personal Watercraft

The proposed regulation would redefine "motorized personal watercraft" such that the definition would be more inclusive, so that all MPWC, regardless of carrying capacity, would be restricted from use in the Sanctuary, with the exception of the four existing and one new designated zones. This Proposed Action would reduce the number of MPWC used in the Sanctuary and limit the remaining MPWC use to the zones. This would have minor beneficial future impacts on water quality, particularly in the near-shore area where MPWCs are predominately used. Moving the use of MPWC out of the surf zone would also reduce the incidences of groundings that sometimes result in the discharge of oil and gas into the intertidal or beach areas.

As described in Section 3.5.1, water quality concerns related to use of MPWC include the discharge of unburned fuel into the water while engines are running and the release of hydrocarbons from oil and gasoline tanks in flipping incidents. Contaminants include methyl tertiary butyl ether (MTBE), an oxygenate added to gasoline, and polycyclic aromatic hydrocarbons (PAHs), by-products of the combustion process. Reduced use of MPWC would reduce the amount of potential contaminated discharges, thus providing a minor beneficial impact on marine water quality.

Dredge Disposal—SF-12

The proposed regulation modification would adjust the location of the SF-12 Dredge Disposal Site to the head of the Monterey Canyon (see Figure 2-5). No increase in the volume of dredge material is part of this proposed action. The purpose of this proposal is to relocate the disposal site to its original intended destination approximately 900 feet farther offshore than its current location and in deeper waters, which would reduce impacts on local beaches and nearby harbors and estuaries caused by current disposal in the nearshore subtidal area.

Movement of the site would reduce siltation and increase the quality of seawater entering the Moss Landing Marine Laboratories seawater intake system. Placement of the material close to the head of the canyon should increase the flow of sediment into the deep sea fan, as has been observed by USGS researchers.

Movement of the SF-12 dredge disposal site from its existing location to the proposed site would result in an increase in the turbidity of the water column in the area associated with the new dredge disposal. However, the material would likely be carried by turbidity currents farther down into the canyon and distributed in the deep water environment, rather than concentrated in the nearshore zone. Movement of the site would reduce existing impacts associated with dredged sediment being washed into the surf zone at Moss Landing and deposited in the beach, harbor and estuary areas. An increase in the percentage of material that enters the Monterey Canyon will reduce sedimentation in the nearshore benthic areas north of the canyon, where much of the disposal occurs at this time. Reduced sedimentation would improve local water quality conditions.

The Proposed Action would have slightly adverse impacts for the water quality at the new site location, but it would have beneficial future impacts on water quality in the current location of the dredge site. The US Army Corps of Engineers and USEPA issued a special public notice, in December 2005, announcing the correction of this dredge disposal location (US Army Corps and USEPA 2005). In their announcement, the agencies concurred that environmental benefits would result from the relocation, including a reduced likelihood that suspended sediments will enter the upper water column. As the expected beneficial impacts on water quality in the surf zone are greater than the expected minor adverse impacts at Monterey Canyon, the Proposed Action would have an overall beneficial future impact on water quality in the Sanctuary.

Dredge Disposal—Monterey and Santa Cruz

The proposed regulation modification would also identify, codify, and recognize the two dredge disposal sites at Twin Lakes State Beach (Santa Cruz Harbor) and Monterey Harbor. These sites have not been consistently identified by coordinate location or have been identified by different descriptions. The use of these two dredge disposal sites predates the designation of the Sanctuary, and the two sites have been recognized as sites approved for dredge disposal subject to the conditions set forth in permits approved by USACE and USEPA subject to MBNMS authorization. Both sites are currently being used for dredge disposal.

The Proposed Action is considered a technical change with no environmental or socioeconomic impact. Any modification to the volume or location of dredge material would require a separate permit process and environmental review. The Proposed Action would have no impacts on water quality in the Sanctuary.

Alternative Regulatory Actions

The alternative would have the same impacts on water quality as identified in the Proposed Action, with the following minor differences:

Davidson Seamount Alternatives

The two alternatives for inclusion of the Davidson Seamount into the boundaries of MBNMS would result in the same beneficial impacts on water quality as described for the Proposed Action. The circular boundary alternative would provide a slightly larger area for inclusion than the Proposed Action and therefore result in a slightly larger area subject to discharge limitations. Limiting discharge over a larger area would provide slightly increased protection of water quality compared to the Proposed Action. The NMSA alternative would provide the same sized area for inclusion the Proposed Action, but would proposes that the NMSP regulate bottom contact gear under the NMSA. This regulation would prevent physical disturbance to the benthic environment, but would only be expected to have negligible benefits beyond the Proposed Action. Therefore, these alternatives would both result in the same beneficial impacts on water quality as described for the Proposed Action.

Motorized Personal Watercraft Alternative

The alternative action would eliminate the four designated MPWC-permitted use zones, thereby eliminating use of MPWC in the entire Sanctuary. This would result in a reduction in hydrocarbon releases in the surf zone (in both the air and water) in the areas where MPWC are currently used as well as in the rest of the Sanctuary. By further reducing the potential for releases, this alternative would have a slightly greater beneficial impact on water quality than the Proposed Action.

The No Action Alternative

The No Action alternative would continue to manage the Sanctuary as it is currently managed, and no additional protections from deserted vessels and MPWC discharges and spills would be implemented. The No Action alternative would maintain the status quo and would not provide the Sanctuary with enhanced protections for water quality.

3.5.8 Cumulative Impacts

The ROI for cumulative impacts is the same as the ROI described above. This section addresses the cumulative effects on water quality in the sanctuaries from land-based pollution sources, such as coastal development, storm water and sewage, agriculture, and industrial activities, and marine-based pollution, such as vessel discharges, ports and marinas, and oil spills.

Adverse impacts on water quality in the sanctuaries are largely a consequence of increasing coastal populations and developments. Coastal population increases mean increasing levels of sewage and contaminated effluent are discharged by point and nonpoint sources into the marine environment. Sewage treatment plants can release low levels of heavy metals, pesticides, and nutrients, as well as fresh water, into receiving water. During storms, San Francisco, which has a combined sewer overflow system, may discharge raw sewage into the ocean due to lack of sufficient treatment capacity. Stormwater discharge is becoming more of a concern with population pressures because the existing sewage treatment infrastructure is becoming more overloaded and subject to more frequent discharges. For example, roadway development results in increased levels of hydrocarbon-contaminated stormwater runoff. Construction of new desalination plants, which impact salt concentrations (brine discharge), turbidity, temperature, oxygen levels, and chemical make-up (chlorine, metals, and other chemicals are used in the treatment process) of the receiving environment, have significant water quality impacts (California Coastal Commission 1993). There are several water desalination plants proposed in the ROI, including adjacent to Monterey Bay and in coastal Marin County, however none have received all the needed approvals and permits to actually begin construction.

Nonpoint pollution sources include agriculture and industrial activities. Agricultural runoff contains high levels of nutrients and pesticides. Much of the coastal area adjacent to the ROI is developed for agriculture, particularly in the Salinas Valley, near Watsonville, coastal San Mateo County, and the area around Tomales Bay. As agriculture intensifies in the watersheds adjacent to the sanctuaries, adverse impacts on the water quality may increase.

Development of marinas, piers, and ports also contributes to increases in water pollution, as recreational boats and vessels have localized releases in these areas. Pollutants may include oil, fuel, detergents, paint, and sewage (McCoy and Johnson 1995). The disposal of dredged and landslide materials in the sanctuaries have water quality impacts associated with suspended sediments and contaminated sediments. Increasing vessel traffic, including recreational boats, MPWC, cargo vessels, and cruise ships, may have increased impacts on water quality, including the increased risk of oil spills, as discussed earlier. Finally, the potential development

of submerged cables in the sanctuaries would have water quality impacts, including turbidity issues during the laying and removal stages, and release of drilling lubricants.

Implementation of the FMPs will contribute to the ROI's regional ecosystem health, including water quality, by applying the various protective action plans in CBNMS, GFNMS, and MBNMS. Cross-cutting management associated with ecosystem monitoring will provide a better understanding of water quality along coastal northern/central California and what, if any, improvements could be made. GFNMS and MBNMS action plans specific to water quality would have similar beneficial impacts on water quality. Such action plans would include the Estuarine and Nearshore Environments, Open Coastal Environment, and Additional Areas action plans in GFNMS and the Beach Closures and Microbial Contamination, Cruise Ship Discharges, and Water Quality Protection Program Implementation action plans in MBNMS. The Vessel Spill action plan would also have a beneficial impact on water quality within GFNMS by managing the likelihood of such spills and the effectiveness of spill responses. The MBNMS Desalination, Harbors and Dredge Disposal, and Cruise Ship Discharges action plans would provide beneficial impacts on water quality by imposing restrictions on discharges.

The Proposed Action

The Proposed Action would not contribute to any of the cumulative adverse trends because the Proposed Action would result in only beneficial impacts on water quality by establishing additional restrictions on harmful discharges. The Proposed Action would contribute to cumulative beneficial impacts, and would help mitigate any ongoing adverse cumulative trends on water quality resulting from ongoing development, sewage discharge, and runoff.

Alternative Regulatory Actions

The only alternative regulatory actions that would affect water quality would be the cruise ship discharge prohibition and prohibition of MPWC use in MBNMS. Although beneficial effects would occur, cumulative discharges would be greater and water quality benefits slightly lower with the cruise ship discharge alternative, compared to the Proposed Action, because cruise ships would be allowed to discharge treated wastewater. Cumulative water quality impacts associated with the alternative MPWC prohibition would be similar to those described under the Proposed Action, with an increase in the level of beneficial impacts due to the decreased use of MPWC afforded by this alternative.

The No Action Alternative

The No Action alternative would maintain the status quo of sanctuary management. No additional water quality protections from proposed regulations would occur. There would be cumulative adverse impacts on water quality from development, sewage discharge, and various forms of runoff, among other things. There would also be beneficial impacts on water quality from existing regulation and management efforts, including implementation of the FMPs. Because the No Action alternative would maintain sanctuary management as status quo, the No Action alternative would not achieve the same level of beneficial effects as described for the Proposed Action.

3.6 COMMERCIAL FISHERIES

This section addresses both commercial fishing resources and socioeconomic effects on the commercial fishing industry. The ROI for commercial fisheries consists of the commercial fish resources in the sanctuaries and the proposed Davidson Seamount addition to the MBNMS, the commercial fishery vessels operating in the sanctuaries, and the ports where those vessels land their fish.

Primary information sources include a report prepared by Ecotrust (Scholz et al. 2005) for the JMPR, *Socioeconomic Profile of Fishing Activities and Communities Associated with the Gulf of the Farallones and Cordell Bank National Marine Sanctuaries* (Scholz et al. 2005), a report prepared by California Sea Grant, *Fishery Resources of the Monterey Bay National Marine Sanctuary* (Starr, Cope and Kerr 2002), and various CDFG databases that the reports draws on—notably the commercial fisheries landings data.

3.6.1 Regional Overview of Affected Environment

This section presents information for the three-sanctuary area, which was derived from the reported landings that occurred in the ports adjacent to the three sanctuaries. Due to the lack of specificity and accuracy of the spatial information in the CDFG landing receipts and logbook datasets, which contain information on fishing locations for only a fraction of the fleet, it is impossible to infer what proportion of fishing vessels operates in the waters of each sanctuary. Because the proportion of the fleet cannot be identified from these datasets, the landings values are in many cases an overestimation of the values associated with the sanctuary waters. They are, however, an accurate descriptor of the pounds landed and ex-vessel revenues (the payment received at the point of landing for the catch) generated in the ports (Bodega Bay to Morro Bay) adjacent to the sanctuary waters. These ports have been classified into four groups: Bodega Bay, San Francisco, Monterey, and Morro Bay area ports (Table 3-5). It should be noted that many of the cities listed in Table 3-5 are not points of initial landing but rather ultimate destinations for the landed product; fishermen are required to complete transportation receipts to move harvested resources from the point of initial landing to remote sites.

Table 3-5
Listing of Individual Ports by Port Group

For each port group, the top ports in terms of ex-vessel revenue are bolded. The number within the parentheses indicates the average percent of ex-vessel revenue per port group (1999-2003)

Bodega Bay Area	San Francisco Area		Monterey Area	Morro Bay Area
Bodega Bay (90%)	Alameda	Newark	Aptos	Arroyo Grande
Bolinas	Alamo	Oakland	Big Creek	Atascadero
Corte Madera	Albany	Oakley	Big Sur	**Avila (30%)**
Dillon Beach	Alviso	Pacifica	Capitola	Baywood Park
Drakes Bay	Antioch	Palo Alto	Carmel	Cambria
Forrest Knolls	Benicia	Pescadero	Freedom	Cayucos
Greenbrae	Berkeley	Pigeon Point	Gilroy	Grover City
Hamlet	Brentwood	Pinole	Marina	**Morro Bay (69%)**
Healdsburg	Burlingame	Pittsburg	Mill Creek	Nipomo
Inverness	Campbell	Pleasanton	**Monterey (22%)**	Oceano
Jenner	China Camp	Point Montara	Monterey Area	Pismo Beach
Kentfield	Concord	Point San Pedro	**Moss Landing (70%)**	San Luis Obispo

Table 3-5
Listing of Individual Ports by Port Group *(continued)*

For each port group, the top ports in terms of ex-vessel revenue are bolded. The number within the parentheses indicates the average percent of ex-vessel revenue per port group (1999-2003)

Bodega Bay Area	San Francisco Area		Monterey Area	Morro Bay Area
Marconi	Crockett	**Princeton (31%)**	Pacific Grove	San Miguel
Marshall	Daly City	Redwood City	Pebble Beach	San Simeon
Mill Valley	Danville	Richmond	Salinas	Shell Beach
Muir Beach	El Sobrante	Rio Vista	**Santa Cruz (7%)**	
Nicasio	Emeryville	Rockaway Beach	Seaside	
Novato	Fairfield	Rodeo	Soquel	
Occidental	Farallon Is	San Bruno	Watsonville	
Petaluma	Foster City	**San Francisco (54%)**	Willow Creek	
Point Reyes	Fremont	San Jose		
San Quentin	Glen Cove	San Leandro		
San Rafael	Hayward	San Mateo		
Santa Rosa	Lafayette	**Sausalito (10%)**		
Sebastopol	Livermore	South San Francisco		
Sonoma	Los Altos	Suisun City		
Stewarts Point	Martinez	Sunnyvale		
Stinson Beach	Martins Beach	Vacaville		
Tiburon	Mcnears Point	Vallejo		
Timber Cove	Moss Beach	Yountville		
Tomales Bay	Mountain View			
Windsor	Napa			

Source: Scholz et al. 2005

Fishing Vessels

Table 3-6 shows the number of commercial fishing vessels that reported catches in each of the major port groups that are adjacent to the sanctuaries (Bodega Bay area, San Francisco Bay area, Monterey area and Morro Bay). Data from 1981-2003 show that an average of 2,100 commercial fishing vessels made landings in the ports adjacent to the three sanctuaries on an annual basis. These are unique vessels, spanning all gear types. In 2003 only about half of that average, 1,114 made landings in the three-sanctuary area (Scholz et al. 2005).

Due to intensive fishing of deep-water species (particularly groundfish) in the 1980s, many fish populations declined between 1990 and 2000. In response, fisheries management became more restrictive, and the number of fishing vessels in the three-sanctuary area decreased significantly between 1996 and 2003. For example, the five major ports near MBNMS (Monterey, Moss Landing, Santa Cruz, Avila and Morro Bay) experienced an overall 40 percent decline in the number of operational commercial vessels from 1980 to 2000 (Starr, Cope and Kerr 2002), a trend that is mirrored in ports associated with all three sanctuaries (Ecotrust 2004). Figure 3-2 illustrates the trends in ports adjacent to the three-sanctuary area over time, compared to the statewide trends (Scholz et al. 2005 and Starr et al. 2002).

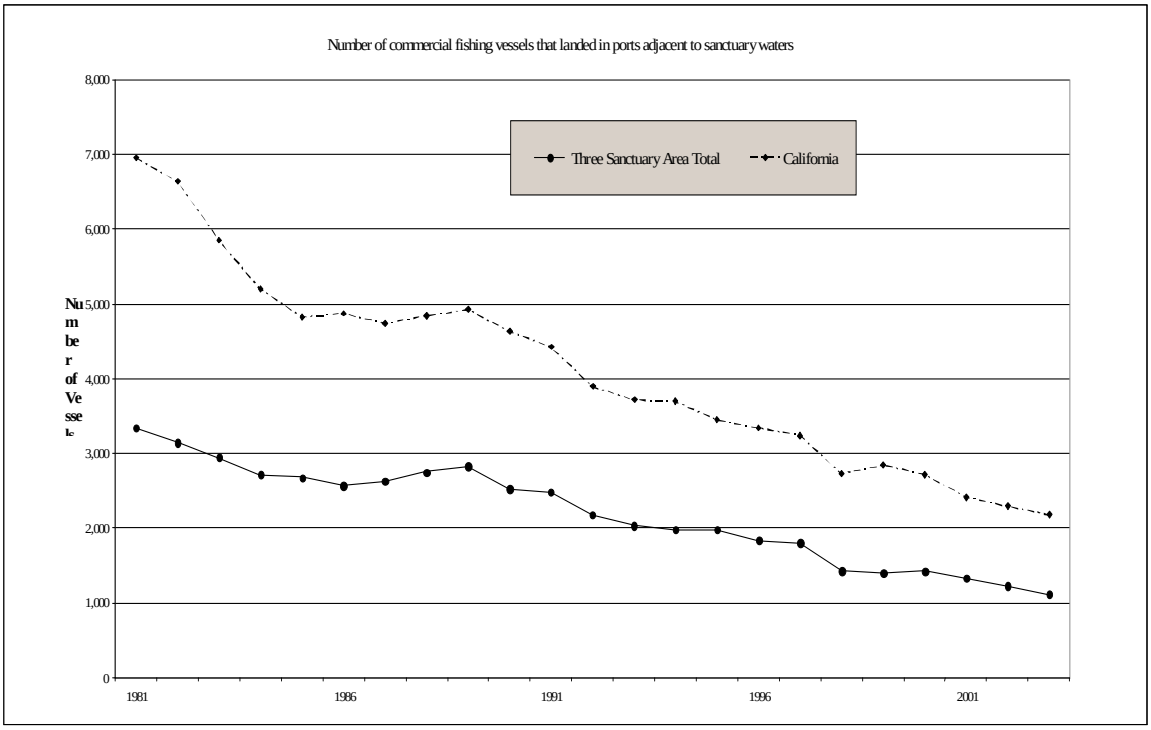
Table 3-6
Number of Commercial Fishing Vessels Reporting
Catches per Major Port Group adjacent to the Three-Sanctuary Area

Year	Bodega Bay Area	San Francisco Area	Monterey Area	Morro Bay Area	Total
1981	1,048	1,511	1,164	551	3,340
1982	1,081	1,506	1,042	508	3,146
1983	673	1,397	1,172	485	2,949
1984	788	1,448	983	430	2,720
1985	888	1,418	910	405	2,678
1986	810	1,270	834	456	2,566
1987	1,024	1,320	807	435	2,630
1988	1,082	1,422	785	445	2,749
1989	957	1,523	843	440	2,831
1990	798	1,216	836	490	2,521
1991	785	1,197	776	493	2,485
1992	634	1,064	688	514	2,184
1993	575	997	719	494	2,033
1994	601	973	549	498	1,982
1995	570	942	662	491	1,979
1996	401	844	668	452	1,838
1997	385	885	661	431	1,800
1998	339	706	454	352	1,424
1999	357	699	446	295	1,394
2000	361	697	540	332	1,421
2001	338	631	456	314	1,331
2002	297	585	384	254	1,222
2003	308	479	343	232	1,114

Source: Scholz et al. 2005.

Notes: The total column is the unique number of vessels that reported catch in the three-sanctuary area. There are many cases where vessels make landings in multiple port group areas during a given year, hence the reason the total is less when adding the four port group totals.

Figure 3-2 Number of Commercial Fishing Vessels Landing Catches Adjacent to the Three-Sanctuary Area Compared to All of California



Source: Scholz et al. 2005.

Ports

Fishing vessels catching fish in the three sanctuaries come from all over California, including Morro Bay, Dillon Beach, Santa Barbara, San Diego, Monterey, Moss Landing, Santa Cruz, Princeton Harbor/Half Moon Bay, San Francisco Bay ports, Tomales Bay, Bodega Bay, and Fort Bragg. Most fish harvested in the sanctuaries are landed at San Francisco Bay ports, Princeton/Half Moon Bay, Fort Bragg, and those in Monterey Bay (Santa Cruz, Moss Landing and Monterey) (Scholz et al. 2005; Starr, Cope and Kerr 2002).

Gear

CDFG identifies 64 different fixed and mobile gear types; many of these are subtle variations of the basic gear types, the latter of which account for the majority of fishing revenues. The following basic gear types are also the most frequently used gear types used in the three sanctuaries (Scholz et al. 2005; Starr, Cope and Kerr 2002):

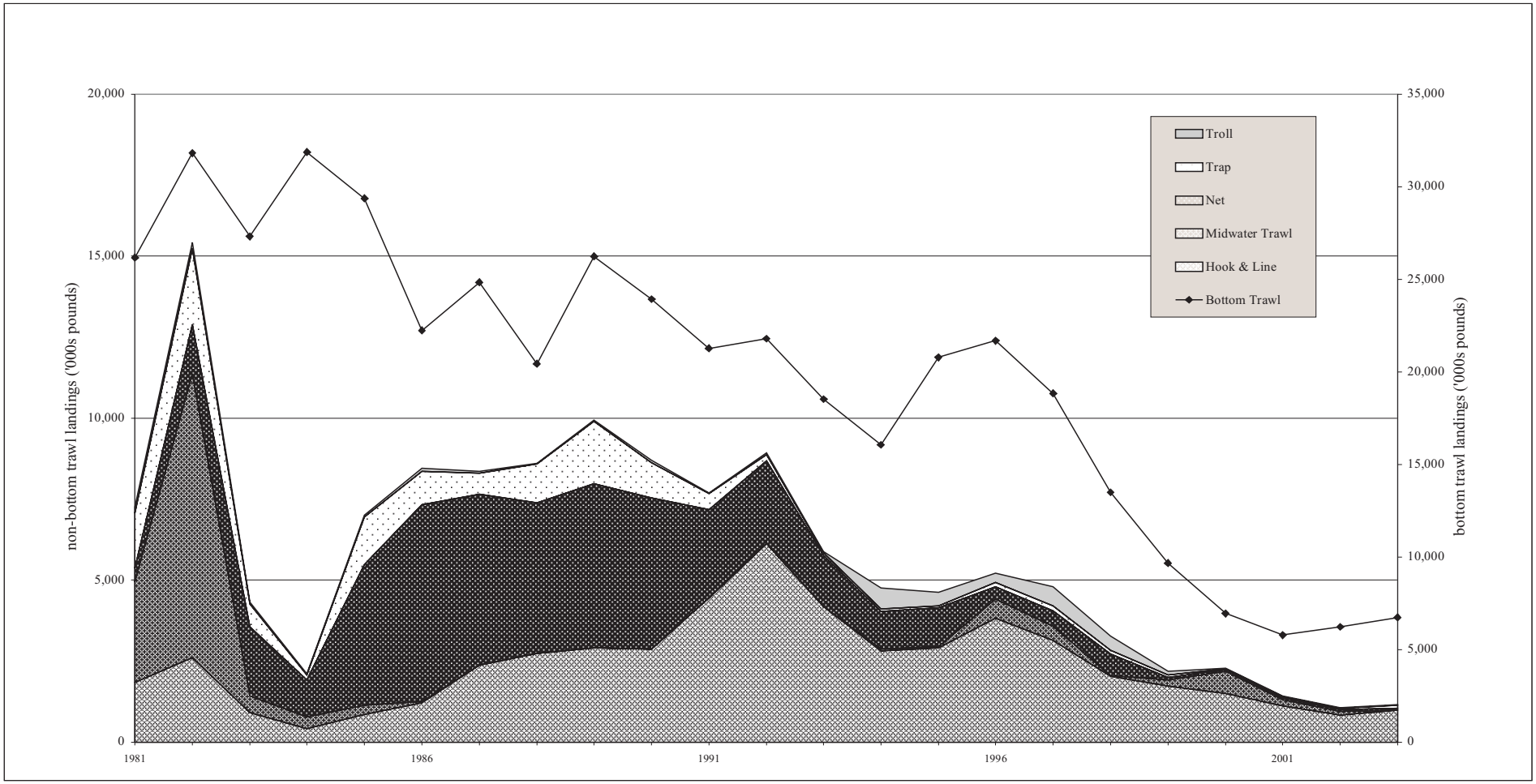
- Trolling for salmon, groundfish, or tuna;
- Crab traps;
- Purse seines;
- Set longlines;
- Other hook-and-line;

- Trawl nets;
- Fish traps;
- Set gill nets; and
- Jigs.

It should be noted that these gear types have undergone considerable fluctuations in the extent to which they have been used over time. As Figure 3-3 illustrates, in the groundfish fishery both mobile (trawl) and fixed (hook-and-line, jig) gear has been used, but the prevalence of the former has declined considerably over the last 23 years. Other types of gear—notably hook-and-line gear—peaked in the mid-1990s. It should be noted that declines are not entirely due to decline in fish populations; declines are also linked to restrictions placed on the fisheries by federal regulations.

One fishery that is particularly pertinent to the regulatory measures considered in this EIS is the groundfish trawl fishery. Using the set and haul points recorded in CDFG logbooks, it is possible to summarize the cumulative tow intensity for the six-year period from 1997-2002 in terms of number of tows per unit area, as shown in Figures 3-4 and 3-5. As should be apparent, there are distinct areas of higher trawl intensity in all three sanctuaries.[1]

[1] It should be noted in reviewing the trawl data in Figures 3-4 and 3-5 that tows generally follow fathom contours rather than straight lines connecting the set and up points. Also, it is common occurrence for vessels to start at one location, reach a half way point and turn around to return near the starting point for the end of the tow. Therefore, tows that appear to be short (due to the proximity of the set and up points) may not necessarily be that short.



Source: Scholz 2005

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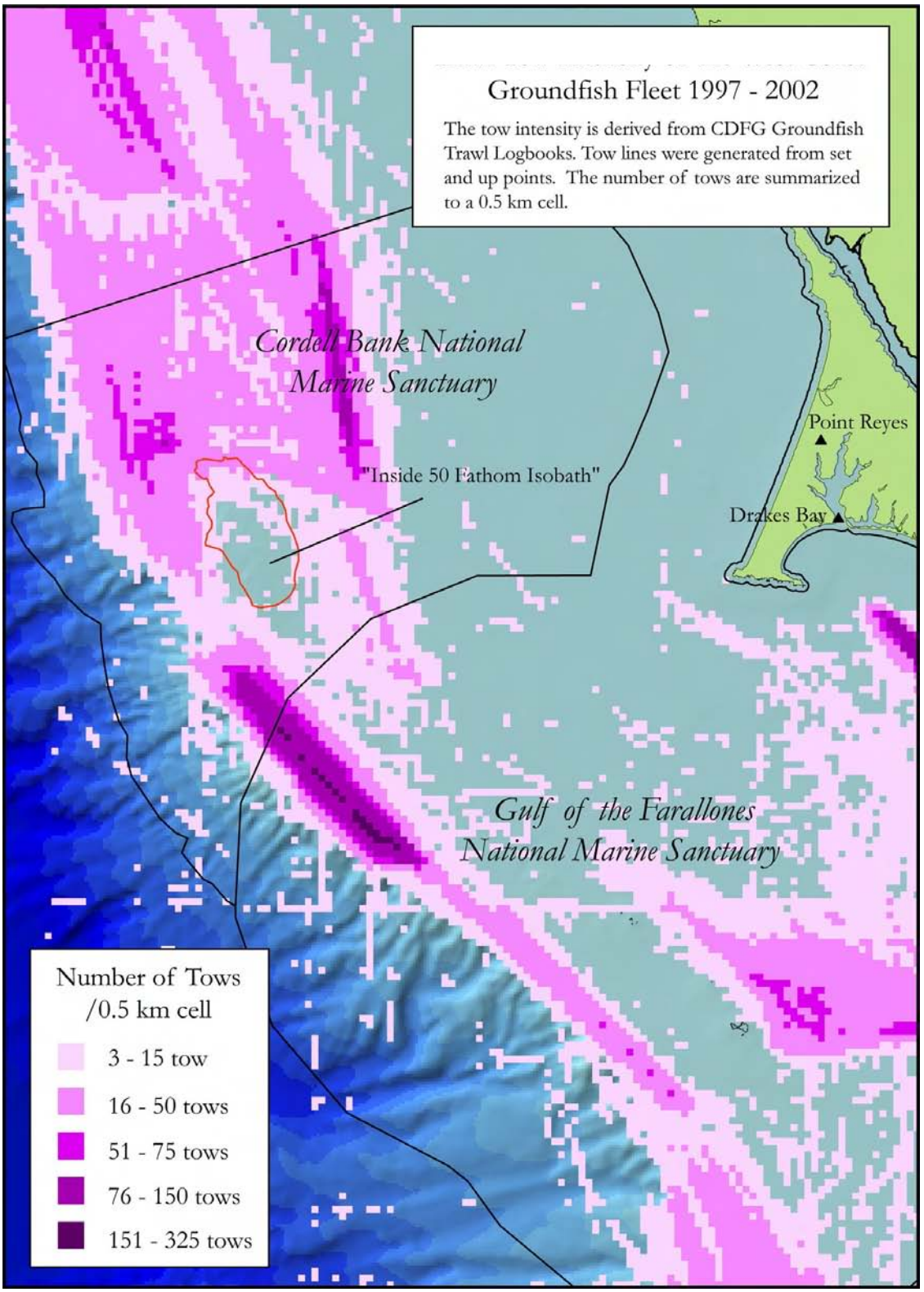
Groundfish Gear Evolution, 1981-2003



Source: Scholz 2005

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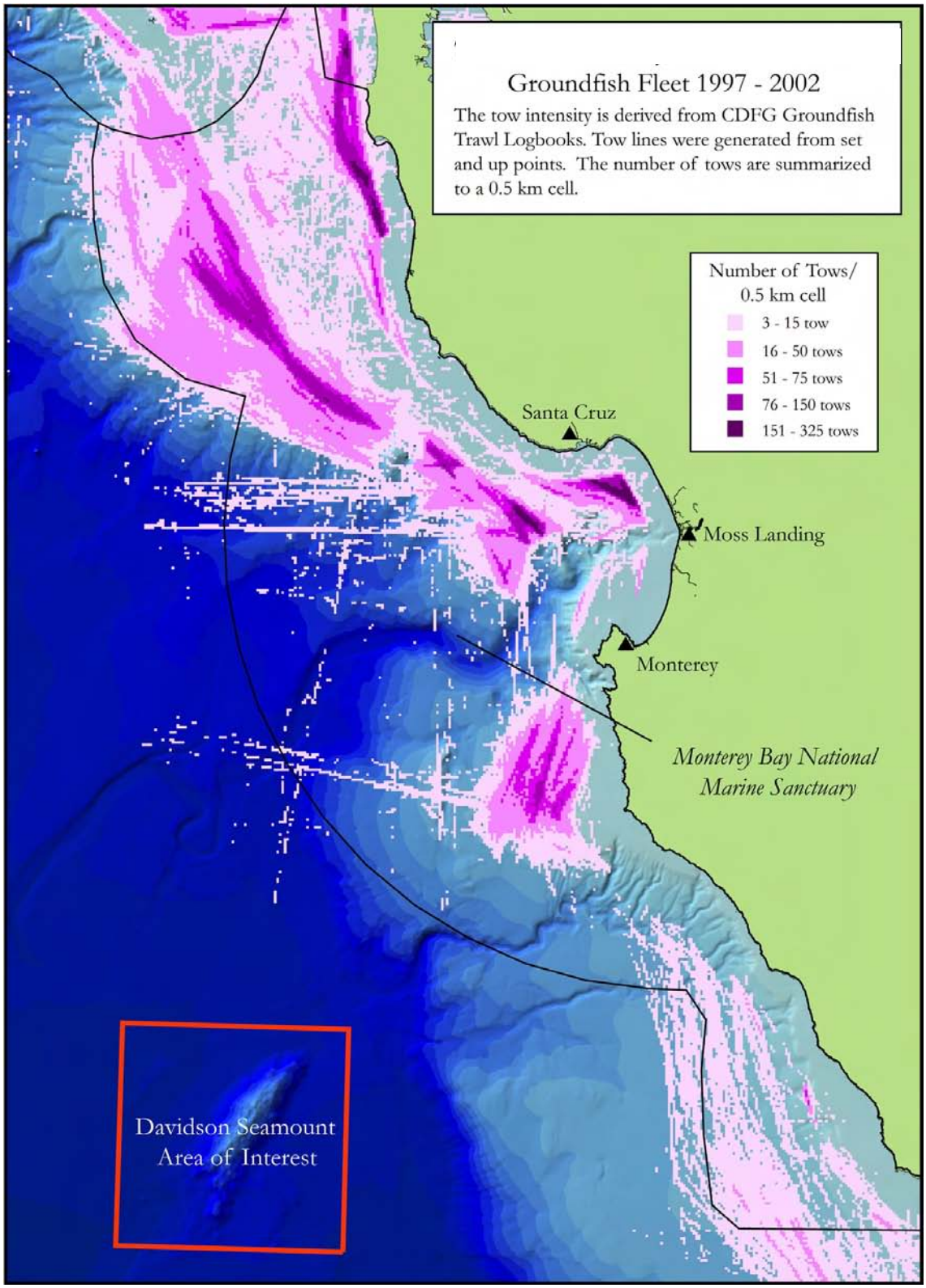
Trawl Intensity in Cordell Bank National Marine Sanctuary & Gulf of the Farallones National Marine Sanctuary

Northern/Central California



Source: Scholz 2005

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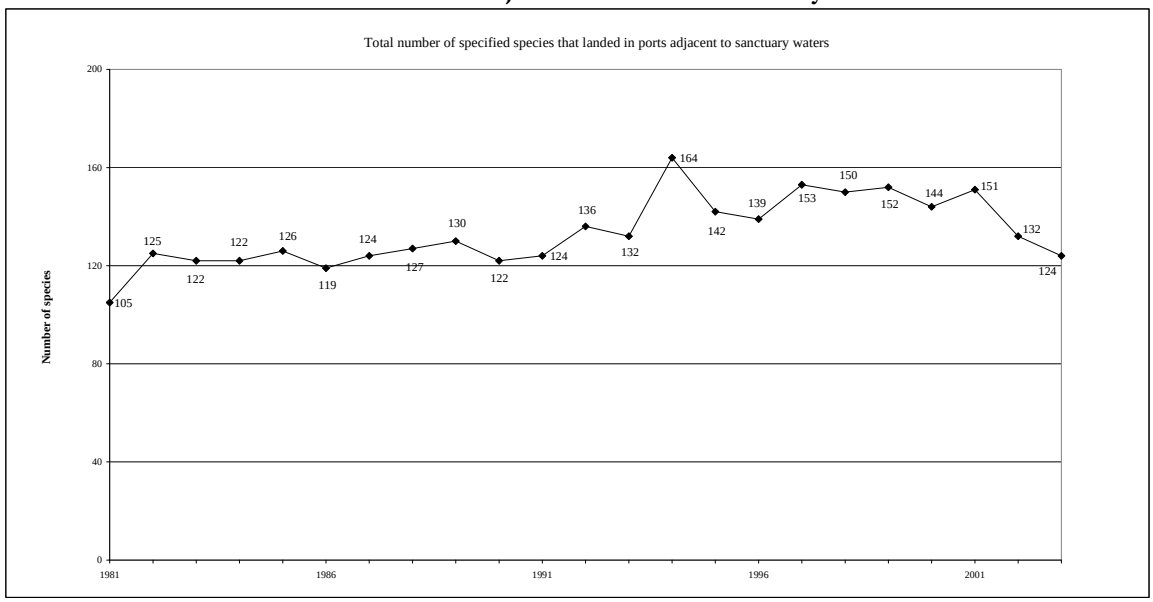
Trawl Intensity in Monterey Bay National Marine Sanctuary

Northern/Central California

Species Harvested

An estimated total of 300 different fish species have been harvested and landed in the three-sanctuary study area over the last 23 years, and these species can be grouped into the following five categories: invertebrates (crab, shrimp, prawn, abalone, octopus, squid, sea urchin), groundfish (rockfish, flatfish, roundfish, shark, skate), small coastal pelagic species (anchovy, squid, bonito, sardine, saury, and mackerel), highly migratory species (tuna, shark, billfish/swordfish, dorado), and salmon (chinook and coho) (Scholz et al. 2005). As presented in Figure 3-6, the annual number of species harvested in the three-sanctuary area averaged 130 species over the last 23 years, the fewest being harvested in the 1980s, peaking in 1994 at 164.

Figure 3-6 Total Annual Number of Species Landed In Ports Adjacent to Three-Sanctuary Area



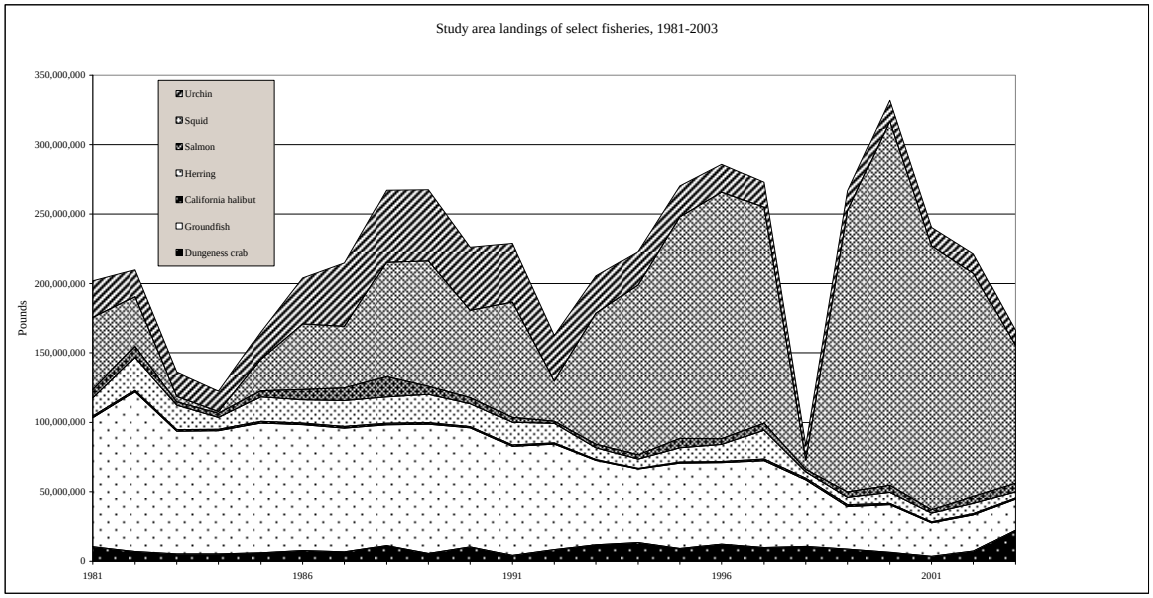
Source: Scholz et al. 2005.

Finer scale data on recent trends in target species were available for CBNMS and GFNMS, the combined study area of the 2005 Ecotrust report (Scholz et al., 2005), as illustrated in Figure 3-7. Groundfish and herring historically dominated landings from Bodega Bay to Half Moon Bay (although the majority of herring landings came from San Francisco Bay, which is not within marine sanctuary boundaries). In more recent years squid, salmon and Dungeness crab have accounted for the greatest quantity of fish landed. These variations are a result of market fluctuations, environmental factors, and regulatory conditions (Scholz et al. 2005).

Catch Values and Quantities

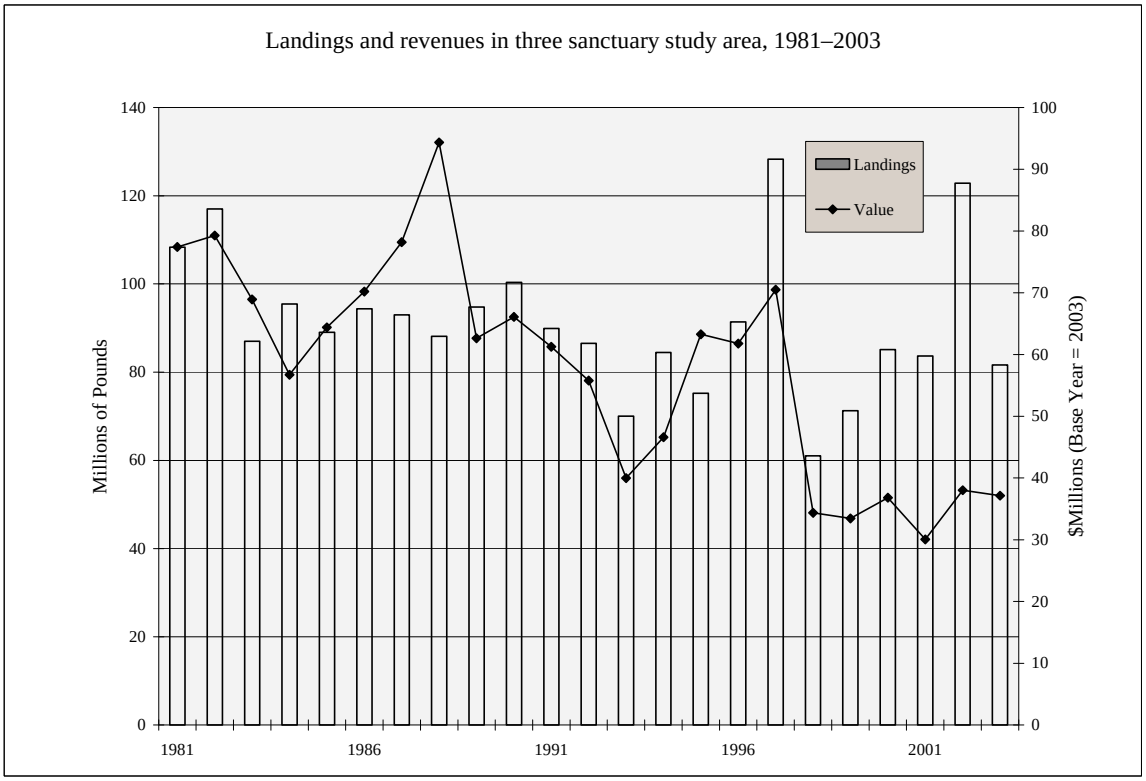
Figure 3-8 presents total catch amount and ex-vessel values for the ports adjacent to the three sanctuaries. The commercial fishing industry derived most economic value from the three-sanctuary area in 1988, with 88 million pounds caught and combined ex-vessel revenues of $94.3 million. After 1997, there was a precipitous drop in ex-vessel revenue, which over the next six years averaged around $35 million a year and bottomed out at $30 million in 2001. Over that same time period, the total catch experienced a steep decline in 1998, with a 50 percent reduction from 128 million pounds in 1997 to 61 million pounds, but rebounded to roughly the same totals in the mid-1990s and then peaked again in 2002 at 123 million pounds. The large contrast between the ex-vessel revenue and total catch landed indicates a probable shift to relatively higher volume, but lower value fisheries, or a decrease in the average value (per pound) of fish caught in California.

Figure 3-7 GF & CB Sanctuary Area Landings of Select Fisheries, 1981-2003



Source: Scholz et al. 2005.

Figure 3-8 Total Landings and Ex-vessel Revenue Reported to the Ports Adjacent to the Three-Sanctuary Area, 1990-2003



Source: Scholz et al. 2005.

Table 3-7 summarizes CDFG data for all landings and value by species group for the three-sanctuary area for 1990 and 2000. The table is sorted according to the highest value fisheries and captures the top ten species or species groups for each of the years. There were large shifts in the landed pounds and value of many species over this 10-year time period. Most notably, groundfish, salmon, and Pacific herring values declined sharply, even though they were in the top four in both years. In any year, total landings and ex-vessel value of a fishery depend on stock abundance and availability, market factors, and existing management regulations.

Table 3-7
Top Ten Ex-Vessel Revenue Producing Species\Species Groups Reported to the Ports Adjacent to the Three-Sanctuary Area, Pounds and Ex-vessel Value, 1990 and 2000

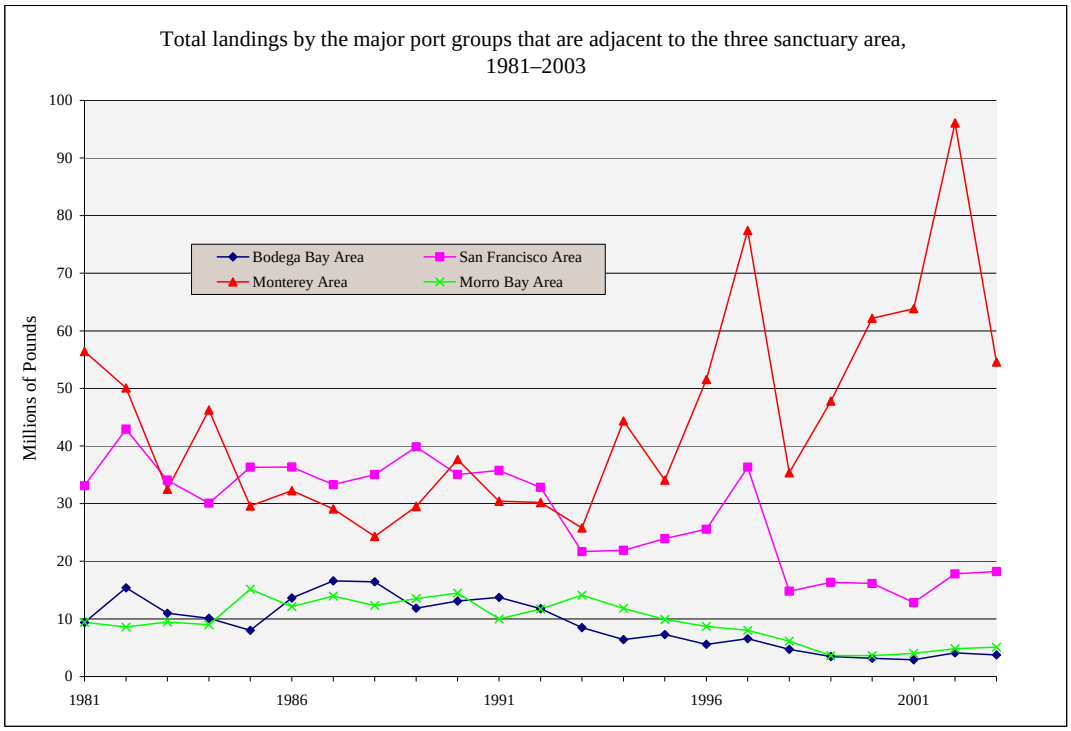
2000			1990		
Species Group	***Pounds***	***Value***	***Species Group***	***Pounds***	***Value***
Salmon	4,689,438	$9,973,648	Groundfish	36,225,744	$19,140,530
Groundfish	9,250,615	$7,570,581	Salmon	3,456,503	$13,388,248
Dungeness Crab	1,329,700	$3,742,241	Herring	16,381,958	$12,176,023
Herring	7,843,709	$3,113,885	Swordfish	918,690	$4,492,836
Squid	15,708,714	$2,051,354	Urchin	5,573,484	$3,839,533
Prawn	220,261	$1,969,220	Dungeness Crab	1,121,663	$3,268,920
Tuna	1,862,491	$1,882,763	Squid	17,739,081	$2,077,458
Halibut	392,512	$1,089,681	Halibut	410,674	$1,372,716
Sardine	25,060,727	$1,037,103	Tuna	737,540	$922,628

Source: Scholz et al. 2005.

Figure 3-9 shows the total pounds of fish caught in each of the major port groups adjacent to the three sanctuaries from 1981 to 2004. Over the last ten years the total catch landed in the Monterey area ports has risen to double the catch being reported in San Francisco area ports, and peaked twice, once in 1997 (77 million lbs.), and again in 2002 (96 million lbs.). The increase in catch in the Monterey area was due to the harvest of pelagic species, including Pacific sardine and market squid. While the catch of small pelagic fishes and squid increased, the catch for all other species combined decreased nearly fifty percent (Starr, Cope and Kerr 2002).

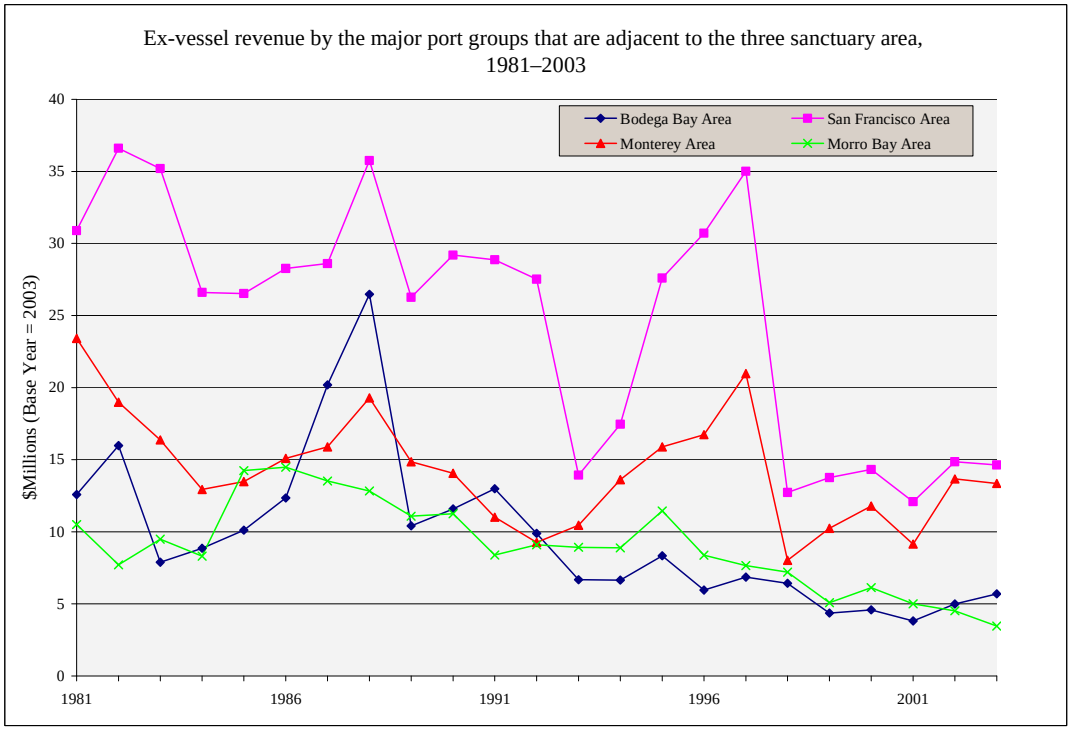
Figure 3-10 presents trends in ex-vessel revenues associated with fish catches. Since 1981, catch values were greatest during the early 1980s and the mid-1990s. The San Francisco area ports have consistently had the highest commercial fishing value of the four port groups. In 1997, the San Francisco area ports had ex-vessel revenues of $35 million. In that same year, the ex-vessel revenues of the catch landed in the other three port groups, Bodega Bay, Monterey, and Morro Bay combined, equaled the ex-vessel value of the catch landed in the San Francisco area ports (Ecotrust 2004). The increase in catch in the San Francisco area just prior to 1997 and the sharp decline afterwards was largely due to the harvest of Pacific herring from San Francisco Bay. By contrast, the peak in 1988 is attributable to the salmon boom, which produced roughly $15 million in ex-vessel revenue, and accounted for 40 percent of the total value of fish landed in the San Francisco area that year.

Figure 3-9 Total Pounds of Fish Landed in Each of the Major Port Groups, 1981–2003



Source: Scholz et al. 2005.

Figure 3-10 Ex-vessel Revenue from Fish Landed in Each of the Major Port Groups, 1981–2003



Source: Scholz et al. 2005.
Notes: The figures for 1983 are not reliable and likely underestimate actual revenues, since even after estimating revenues for landing receipts where no price information was available, about 25 percent of records show no revenues at all.

Environmental Factors

As discussed in Section 3.4, Oceanography and Geology, the oceanic waters off the coast of California experience environmental fluctuations, including the California Current fluctuations and ENSO events. These natural variations result in changes in ecological relationships and can alter the primary species or species groups that are harvested. For example, the position and intensity of the Aleutian Low Current determines the influence of primary production in the California Current, which in turn affects zooplankton abundance, which in turn affects fish production in the Alaska Current. During years when a more intense Aleutian Current is present, the Alaska Current is productive, and the California Current is not as productive. During ENSO events, California waters experience increased water temperatures and decreased salinity, and due to these factors, there are often year-class failures for many species, particularly squid, rockfish, and halibut populations (Starr, Cope and Kerr 2002).

Aquaculture/Mariculture

NOAA defines aquaculture as "the propagation and rearing of aquatic organisms in controlled or selected aquatic environments" (NOAA 2006). Aquaculture can be for commercial, recreational, or public purposes. It includes such activities as: fish, plant or invertebrate culture for zoos and aquaria, bait production, wild stock enhancement, rebuilding of populations of threatened and endangered species, and food production for human and/or animal consumption.

Commercial aquaculture has existed in the State of California since the 1850s and in Tomales Bay since the 1890s. Most marine aquaculture is currently conducted in sheltered bays such as Arcata Bay, Drakes Estero, Tomales Bay, Morro Bay and Agua Hedionda (Conte and Moore 2001). In total about 1,952 acres of bottom lands are leased by individuals from the state for marine aquaculture, and about 80% of this area is located in Drakes Estero and Tomales Bay (Moore 2006).

Aquaculture activities in Tomales Bay are conducted within the GFNMS. There are currently 12 individual leases (6 companies) encompassing 513 acres of state bottomlands in Tomales Bay (Moore 2006). This area represents about 26% of the state's marine aquaculture area. Some of the cultivated species include: Pacific oyster (*Crassostrea gigas*), Kumamoto oyster (*C. sikamea*), Sumino oyster (*C. rivularis*), Eastern oyster (*C. virginica*), european flat oyster (*Ostrea edulis*), native oyster (*O. conchaphila*), Manila clam (*Tapes japonica*), Pacific littleneck clam (*Protothaca staminea*), rock scallop (*Hinnites giganteus*), California sea mussel (*Mytilus californianus*), and bay mussel (*M. edulis*) (CDFG 2004b). The most cultured species is the Pacific oyster, followed by the Kumamoto oyster. The only indigenous cultured oyster species is the "native" oyster (*O. conchaphila*); the remainder have been introduced for purposes of aquaculture.

The largest aquaculture operation in the State is located in Drakes Estero (not included in the boundary of the GFNMS), where one individual has two leases that encompass 1,060 acres. This one area represents 54% of the total area currently leased by the State for aquaculture. Some of the species cultivated include: Pacific oyster, rock scallop, manila clam and Pacific littleneck clam.

In addition to bottom culture methods, oysters are now cultured using methods that suspend the oysters above the substrate. This change in the industry was done to protect and enhance productive and sensitive habitat such as eelgrass. Examples include longline culture with clusters strung between short poles, and rack culture with stringers suspended from rails and bag culture. The industry is centered in Humboldt, Tomales and Morro Bays, and Drakes Estero. The industry harvests about one million pounds of shell weight that

corresponds to a value of about $6.8 million; most is consumed regionally, while some is processed in Washington and then sold in California (Conte 2005).

Mussel culturists capture wild mussel seed on net-like structures, and then grow them out to adult size in mesh bags suspended from submerged long lines, racks or off-shore platforms. The mussel industry is centered in Tomales Bay, the Santa Barbara Channel, and Agua Hedionda. Manila clams are grown in Humboldt Bay and occasionally in Tomales Bay. They are grown in mesh bags that are placed on the benthic substrate in the intertidal zone. Mussels and clams together totaled 1.5 million pounds with a value of about $8.5 million dollars (Conte 2005).

There are also three aquaculture facilities in the Monterey Bay area: one cultures abalone in an onshore facility in Davenport; one is located in Half Moon Bay harbor, using cages in a floating raft; and the other cultures abalone under the commercial wharf in Monterey Harbor, which is not in the boundary of the MBNMS. The red abalone (*Haliotis rufescens*) is the only species currently cultivated in MBNMS (CDFG 2006). Abalone are grown in land-based tanks or in cages suspended in the water column (from a raft or wharf). Aquaculturists that operate inwater systems typically obtain small seed abalone from land-based hatcheries for grow-out. Abalone are fed algae when first hatched, and later fed harvested kelp. In 2003, production of live abalone in shell and steaks was 575,000 pounds with a value of about $7.4 million; an additional $1.0 million came from seed sales (Conte 2005).

3.6.2 Regulatory Environment

Commercial fisheries in the sanctuaries are regulated by the PFMC, NOAA Fisheries, the California State Legislature and the California Fish and Game Commission. Coastal fisheries in state waters (up to 3 nm [3.5 miles, 5.5 km] from the shoreline) are generally managed by the CDFG. NOAA Fisheries and the PFMC regulate and manage ocean fisheries beyond state waters (from 3 nm offshore to the extent of the EEZ, 200 nm [230 miles; 370 km] offshore).

Marine Life Management Act, AB 1241

California's Marine Life Management Act (MLMA), which became law on January 1, 1999 (codified in scattered sections of the Cal. Fish and Game Code), regulates the harvest of California's marine living resources, including commercial fisheries. The fishery management system established by the MLMA applies to four groups of fisheries:

1. Nearshore finfish fishery and the white seabass fishery;
2. Emerging fisheries (new and growing fisheries that are not currently subject to specific regulation);
3. Fisheries managed by the Fish and Game Commission before January 1, 1999; and
4. Commercial fisheries for which there is no statutory delegation of authority to the Fish and Game Commission and Department (CDFG 2004a).

Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. §§ 1801-1882

The MSA established the PFMC, one of eight regional councils established by the act. The PFMC has responsibility for establishing and updating management plans for key commercial fish species. Management plans include a *Groundfish Management Plan*, which covers 82 species of rockfish, flatfish, roundfish, sharks, skates, and others. Chinook *(Oncorhynchus tshawytscha)* and coho *(Oncorhynchus kisutch)* are the primary salmon species managed by the PFMC. Five coastal pelagic species are managed by the PFMC, including Northern

anchovy *(Engraulis mordax),* Pacific sardine *(Sardinops sagax),* Pacific (chub) mackerel *(Scomber japonicus),* jack mackerel *(Trachurus symmetricus)* and market squid *(Loligo opalescens).* In conjunction with the International Pacific Halibut Commission, the PFMC manages the Pacific halibut *(Hippoglossus stenolepis),* a large flatfish that migrates between US and Canadian waters, in determining a total allowable catch (TAC) (PFMC 2000).

Highly Migratory Species Management

In 2004, NOAA Fisheries partially approved an FMP for West Coast highly migratory species (HMS) fisheries, species that are currently managed by individual states. The FMP for highly migratory species manages the following species:

- Tunas: north Pacific albacore, yellowfin, bigeye, skipjack, northern bluefin;
- Sharks: common thresher, pelagic thresher, bigeye thresher, shortfin mako, blue;
- Billfish/swordfish: striped marlin, Pacific swordfish; and
- Other: dorado (also known as dolphinfish and mahi-mahi).

The HMS FMP:

- Allows the PFMC to provide advice to NOAA Fisheries and the Department of State, so that West Coast interests are represented in international negotiations and decision-making;
- Increases public awareness about West Coast HMS fishery issues;
- Facilitates greater public involvement in managing HMS fisheries; and
- Helps garner congressional support to the PFMC and NOAA Fisheries for the study and management of HMS fisheries.

The HMS FMP is a "framework" plan, which means it includes some fixed elements as well as a process for creating or changing regulations without amending the plan. In biggest short-term change for fishers stemming from the HMS FMP are new monitoring requirements, which went into effect in 2005. Commercial fishers must obtain a permit from NOAA Fisheries to fish for HMS and maintain logbooks documenting their catch. (Current state-mandated logbooks meet this requirement.) Recreational charter vessels must also keep logbooks. If requested by NOAA Fisheries, a vessel must carry a fishery observer. These measures are intended to improve data collection about HMS catches.

Groundfish Management

The PFMC develops and recommends groundfish harvest specifications and management measures to NOAA Fisheries. It approved a biennial management cycle that went into effect in 2003, where management measures are implemented for a two-year period rather than just for one year. If approved by NOAA Fisheries, these specifications and management measures typically become effective on January 1 at the beginning of the two-year management cycle. Federal groundfish regulations include groundfish harvest levels and fishing restrictions (trip limits, area closures, season lengths, etc.), which are known as the "harvest specifications and management measures (NOAA 2006).

Since 2003, several groundfish conservation areas have been implemented through regulation by NOAA Fisheries Service to reduce overfishing on various groundfish species (NOAA 2006). A groundfish

conservation area is defined by NOAA Fisheries as "any closed area intended to protect a particular groundfish species or species group or species complex." Groundfish conservation areas in the ROI include: rockfish conservation areas, Farallon Islands groundfish closure, and Cordell Bank groundfish closure. The closures have been in existence in the ROI since 2003 and will remain closed until depleted groundfish species are "recovered" under the MSA.

The Rockfish Conservation Areas (RCAs) are large area closures intended to protect a complex of species, such as the overfished shelf rockfish species. The RCAs differ between gear types (e.g., there are a trawl RCA, a non-trawl RCA, and a recreational RCA), vary throughout the year with cumulative limit period, and have boundaries defined by specific latitude and longitude coordinates that approximate depth contours.

Of particular relevance to this FEIS are recent changes to the Groundfish FMP. Amendment 19 has been prepared by NOAA Fisheries and the PFMC to comply with Section 303(a)(7) of the MSA by amending the Pacific Coast Groundfish FMP to:

- Describe and identify essential fish habitat (EFH) for the fishery;
- Designate Habitat Areas of Particular Concern (HAPC);
- Minimize to the extent practicable the adverse effects of fishing on EFH; and
- Identify other actions to encourage the conservation and enhancement of EFH.

The proposed rules and management measures are intended to minimize, to the extent practicable, adverse effects on Groundfish EFH from fishing. On May 11, 2006, NOAA Fisheries published a final rule to implement regulatory provisions of Amendment 19 to the Pacific Coast Groundfish FMP (71 FR 27408). This rule designated the areas within the 50-fathom isobath of Cordell Bank and the Davidson Seamount Management Area (as well as other areas in the ROI) as EFH, and implemented the following prohibitions as applicable within these EFH areas:

- Fishing with dredge gear anywhere in EFH;
- Fishing with beam trawl gear anywhere in EFH;
- Fishing with specified types of bottom trawl gear anywhere in EFH;
- Fishing with bottom contact gear within 50 fathoms of Cordell Bank; and
- Fishing with bottom contact gear or any other gear that is deployed deeper than 500 fathoms (3000 feet) within the Davidson Seamount.

Sustainable Fisheries Act, P.L. 104-297

The Sustainable Fisheries Act (SFA), which became law on October 11, 1996, amended the Magnuson Act, renamed the Magnuson-Stevens Fishery Conservation and Management Act (the Magnuson-Stevens Act). NOAA has responsibilities under the Magnuson-Stevens Act for scientific data collection, fisheries management, and enforcement.

National Aquaculture Act of 1980

The National Aquaculture Act of 1980, Public Law 96-362, as amended, is intended to promote and support the development of both public and private aquaculture and to ensure coordination among the various

federal agencies that have aquaculture programs and policies. It states a national aquaculture policy, establishes a national aquaculture development plan, and requires federal coordination of aquaculture activities.

The California Aquaculture Development Act

The California Aquaculture Development Act of 1979 established the California Department of Fish and Game (CDFG) as the lead agency for aquaculture in the state. In 1982, legislation was passed that provided guidelines and authority for aquaculture regulations developed by the Fish and Game Commission. These guidelines and authority for aquaculture regulations are in California Code of Regulations, Title 14, Natural Resources: Division 1. Fish and Game Commission - Department of Fish and Game. These regulations are referred to as Title 14. CDFG is responsible for issuing leases and permits for specific aquaculture activities and coordinating with two committees, the Aquaculture Development Committee and the Aquaculture Disease Committee, which exist for the purpose of interaction among sectors of the aquaculture industry and government regulatory agencies.

There are several other state agencies that have regulatory authority over certain aspects aquaculture. They include the California Departments of Health Service and Food and Agriculture (disease and health), the State Lands Commission (leased lands), the Coastal Commission (coastal uses and public recreation and access), and the State Water Resources Control Board (water quality).

In federal waters NOAA, US Army Corps of Engineers, EPA, DOI, USDA and the US Department of Health and Human Services all have various jurisdictional oversight over aquaculture facilities and operations. There is also pending legislation relating to aquaculture in offshore waters.

3.6.3 Significance Criteria and Impact Methodology

The criteria used to determine the significance of commercial fisheries impacts are based on social and economic factors and fisheries population dynamics. Impacts are considered to be significant if proposed actions would result in the following:

- Reduced the number of fishing vessels allowed to fish in the area;
- Reduced the size of the allowable catch of a fishery;
- Resulted in a substantial positive or negative population trend in one or more of the harvested species;
- Resulted in significant economic gain or loss to commercial fisheries; or
- Conflicted with the policies and regulations established by the Magnuson Act.

The impact analysis for the commercial fisheries resources area considered the potential impacts of each of the proposed actions on population dynamics of commercial fish species and any operational, social, or economic impacts on the commercial fishery. Any potential impacts were compared to the significance criteria outlined above to determine if adverse impacts are expected from the proposed actions. The overall methodology is consistent with CEQ guidance and NOAA NEPA guidelines (NAO 216-6).

3.6.4 Cross-Cutting Regulations – Environmental Consequences

The Proposed Action

Introduced Species

Controlling the number of introduced species could have both beneficial and adverse effects on fisheries. The Proposed Action could benefit fisheries by limiting the competition between introduced and native species, thus improving the ongoing stability of the native species populations, improving stability in the numbers of native species available for catch, and helping to stabilize the potential for future revenues derived from commercial catch within the sanctuaries. In this regard, the Proposed Action would have a beneficial impact on commercial fisheries.

One of the pathways for the introduction of species into the sanctuaries is through commercial fishing operations, specifically, baiting and processing. The Proposed Action would potentially require commercial fisheries to alter their baiting and processing methods so as to reduce the likelihood for the introduction of species into the sanctuaries. These alterations may increase the burden on the fisheries. This requirement may have minor adverse impacts on commercial fisheries.

The proposed regulation is not expected to negatively impact existing mariculture operations in the ROI. The only mariculture operations within the boundaries of the 3 sanctuaries are twelve existing mariculture lease holders in Tomales Bay. The exception to the introduced species prohibition would grandfather in these current State of California lease agreements that are in effect on the effective date of the final regulation, provided that the renewal by the State of any authorization does not increase the type of introduced species being cultivated or the size of the area under cultivation with introduced species.[2] However, any new lease agreements executed after this date would be subject to this prohibition. Operations conducted under new lease agreements could cultivate native species but would be subject to the prohibition regarding introduced species. NOAA is not aware of any pending lease applications for future mariculture operations in Tomales Bay.

Due to the potential for both beneficial and adverse impacts, the Proposed Action is expected to have no net impact on commercial fisheries (mariculture). The proposed prohibition on introduced species would include an exception for existing mariculture activities in Tomales Bay, thus no impacts would occur on existing mariculture operations in Tomales Bay.

Discharge Regulations Clarifications, MSDs and Graywater

There are several proposed regulatory modifications that would limit general vessel discharges and clarify requirements for use of MSDs within the sanctuaries. These regulations, which are discussed in depth in Section 3.5, Water Quality, are expected to have beneficial impacts on the water quality of the marine sanctuaries. The beneficial water quality impacts would likely in turn have minor benefits for commercial fish species. Fish species would be exposed to fewer contaminants and bacteria and would therefore potentially have a reduced risk of health problems. Better water quality would also create better habitat, which would benefit fish populations and potentially result in increased reproductive success and increases in population sizes.

[2] This provision is intended to limit mariculture to existing leases, not necessarily existing footprints of active lease areas; if an existing mariculture activity takes place within a footprint smaller than the area allowed by the existing lease, the footprint could be expanded up to the limits of the lease area.

Complying with the proposed discharge amendments could result in slight adverse socioeconomic effects on fishermen within the sanctuaries. Fishing vessels would no longer be able to dispose of waste from meals into the sanctuary, which may require some vessels to upgrade their on-vessel disposal facilities so that they could store their waste onboard until they could dispose of it dockside. Fishing vessels would only be allowed to use "clean" (free of harmful matter) materials in deck washing if they wish to allow the washings to drain into the sanctuaries. The potential change in waste disposal facilities and cleaning products may result in minor, increased costs to fishing operations. It should be noted that discharge regulations provide exceptions for fish, fish parts or bait/chumming materials resulting from lawful fishing activity.

The proposed discharge regulations would require fishing vessels that are less than 300 gross tons to discharge other wastewaters (graywater and black water) using a Type I or Type II MSD, or, if they are using a Type III MSD, to hold the waste until they are either out of the sanctuaries or pump out the waste at a harbor pump-out facility. The Coast Guard already requires fishing vessels to have operable Type I, II or III MSDs aboard their vessels, so this is not a new requirement. This regulation essentially clarifies expectations to boaters about the type of discharges that are allowed and does not add any significant burden beyond what is already required by sanctuary or Coast Guard regulations. Existing sanctuary discharge regulations prohibit discharge of raw sewage, which is equivalent to waste that would be discharged from a Type III MSD. A Type III MSD provides no treatment of wastes and serves essentially as a holding tank. The only new requirement in the proposed regulations is that fishermen may have to upgrade their MSD equipment, so that it could not discharge untreated sewage. This requirement may pose a minor burden on boat owners who have not purchased a lock or clasp to ensure the effective operation of the MSD. However, the impact of this addition is negligible. The benefits of doing such activity would actually improve fishing habitat in the long term.

The large-vessel (300 gross tons) discharge/deposit prohibition would result in a minor indirect beneficial impact on commercial fish species through an increase in water quality. Eliminating the potential for discharges/deposits of treated sewage and graywater would have a direct beneficial effect on water quality in the sanctuaries. Improved water quality would have indirect beneficial effects on fish habitat and fishing activities.

In summary, the proposed regulations would have minor beneficial impacts on commercial fish species but may have some minor adverse impacts on some fishing vessels. The proposed regulatory change would not cause a substantive economic loss to the commercial fishery industry; therefore, it is not considered to create a significant adverse impact.

Cruise Ship Discharge Prohibition

By preventing almost all cruise ship discharge into the sanctuaries, this provision would result in a minor indirect beneficial impact on commercial fish species through an increase in water quality. As discussed in Section 3.5, Water Quality, eliminating the potential for substantial discharges of treated wastewater, graywater, oily bilge water, and ballast water would have a direct beneficial effect on water quality in the sanctuaries. Improved water quality would have indirect beneficial effects on fish habitat and fishing activities.

Alternative Regulatory Actions

Cruise Ship Discharge Prohibition Alternative

This provision would result in similar impacts on commercial fisheries as the Proposed Action. Instead of preventing all cruise ship wastewater discharge into the sanctuaries, this provision would allow cruise ships to discharge properly treated effluent so long as it can be shown to be in compliance with water quality standards established by the USEPA and the US Coast Guard in Alaskan waters. Such proof would comprise a discharge plan with associated maintenance logs, approved by NMSP, prior to entry into the Sanctuary. As discussed in Section 3.5, Water Quality, it is possible that ongoing discharge of cruise ship wastewater into the sanctuaries could have minor impacts on water quality, despite being conducted under an approved discharge plan. This alternative could therefore result in a minor beneficial impact on commercial fish species through an improvement in water quality, but slightly less beneficial than the Cruise Ship Discharge Prohibition under the Proposed Action.

The No Action Alternative

The No Action alternative would maintain the status quo. There would be no added water quality benefits to commercial fish species, nor would there be any adverse economic or operational impacts on fishing vessels.

3.6.5 Cordell Bank National Marine Sanctuary – Environmental Consequences

The Proposed Action

Seabed Protection

The proposed regulation would prohibit drilling, dredging, or altering, constructing, placing, or abandoning any structure material or matter on the submerged lands within the line representing the 50-fathom isobath surrounding Cordell Bank. Additionally, the regulation would prohibit seabed disturbance in the remainder of the sanctuary outside the 50-fathom isobath, with the exception of anchoring. The proposed regulation would result in enhanced protections for habitat and species by reducing or eliminating certain physical impacts and associated habitat loss. This in turn would result in beneficial impacts on fisheries resources. This proposed regulation would not create an adverse impact on commercial fishing operations, since the prohibition does not apply to bottom contact gear used during fishing activities. Other lawful fishing activities that do not contact the bottom would be unaffected by this prohibition. Fishing is otherwise regulated by NOAA Fisheries amendments to the Groundfish FMP that prohibit bottom-contact fishing gear on and within the 50-fathom isobath surrounding Cordell Bank.

The NMSP regulation to protect the seabed in the Sanctuary is complementary to recent NOAA Fisheries actions to protect groundfish habitats in the ROI and along the West Coast. On May 11, 2006, NOAA Fisheries published final regulations to implement Amendment 19 to the Groundfish FMP that restricts bottom-contact fishing gear on and within the 50-fathom isobath surrounding Cordell Bank (71 FR 27408)(see Section 2.2.2 for additional details). This regulatory action by NOAA Fisheries protects the benthic habitat on Cordell Bank from impacts associated with bottom contact fishing gear. Prior to that action, in 2003, the PFMC and NOAA Fisheries closed an area of the California coast known as the Rockfish Conservation Area, which included all of CBNMS, to the groundfish fishery and established fishing areas further inshore and offshore. This closure affected both groundfish trawling and longline operations (such as rockfish hook-and-line using set longlines). This restriction is likely to be in place for the foreseeable future to allow recovery of the species complex.

The CBNMS regulations issued under the Proposed Action would provide added and complementary protection to the benthic habitats in this core area and would prevent a further loss and degradation of habitats on the Bank used as core nursery and spawning areas. As a result, the proposed CBNMS Seabed Protection regulation implemented under the Proposed Action would cause an indirect minor beneficial impact on commercial fishing from habitat enhancement. The prohibition of bottom-contact fishing gear is defined and established by the NOAA Fisheries regulations, and is not attributable to any action taken by NMSP. Therefore the Proposed Action would result in a minor beneficial impact on commercial fisheries.

Benthic Habitat Protection

There is an existing benthic habitat regulation that prohibits the removal of, taking, or injuring benthic invertebrates or algae on or within the 50-fathom isobath surrounding Cordell Bank, except for "accidental removal, injury, or takings during normal fishing operations." The proposed regulatory change would clarify that the prohibition does not apply to bottom-contact fishing gear, with language identical to the proposed seabed protection regulation. Fishing related impacts on the benthic resources on Cordell Bank are being addressed by NOAA Fisheries regulations that limit bottom-contact fishing gear on and within the 50-fathom isobath on Cordell Bank. Therefore, the NMSP clarifications to the Cordell Bank benthic habitat regulation will have the same amount of protection as the existing regulation and would result in negligible impacts on fisheries.

Alternative Regulatory Actions

Seabed Protection Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within the line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action. Under this alternative, in addition to the minor corrections and clarifications, NOAA would issue regulations under the authority of the NMSA prohibiting bottom-contact fishing gear within the 50-fathom isobath around the Bank. Lawful use of fishing gear other than bottom-contact gear would be exempt from the regulation. This regulation would result in beneficial impacts to the fish habitat and fisheries because in addition to prohibiting drilling, dredging, or altering, constructing, placing, or abandoning any structure material or matter on the submerged lands it would prohibit the use of bottom contacting fishing gear, which can snag, entangle, break-off, injure and remove fragile bottom habitats on Cordell Bank.

Since this alternative would prohibit bottom-contact fishing gear, it is important to present information on existing and potential commercial fishing activities and restrictions in this area, as it provides the basis for determining the type and extent of impacts. In 2003, the PFMC and NOAA Fisheries closed an area of the California coast known as the Rockfish Conservation Area, which included all of CBNMS, to the groundfish fishery and established fishing areas further inshore and offshore. This closure affects both groundfish trawling and longline operations (such as rockfish hook-and-line using set longlines), so there are no current fishing operations of this type within the 50-fathom isobath of the Bank that would be affected by this alternative. As noted above, this restriction is likely to be in place for the foreseeable future to allow recovery for the very slow reproducing and long-lived groundfish species.

Most benthic or trawl fisheries avoid Cordell Bank since they can easily snag and lose their gear on the Bank's complex benthic structures. Although there has historically been a groundfish trawl fishery in the general area, no trawling has taken place on the Bank due to the high relief of the Bank. There is one known commercial

fishery (rockfish hook-and-line, which includes set longlines) that has historically fished with benthic gear within the 50-fathom isobath of Cordell Bank. Gillnets were also historically fished within the 50-fathom isobath on the Bank, but are no longer allowed, and were prohibited prior to the Rockfish Conservation Area closure.

This discussion considers the level of commercial fishing activity prior to 2003 in order to fully document the historic fishing operations within the 50-fathom isobath of Cordell Bank. Although it is not possible to assess the number of vessels that fished within this particular part of the Sanctuary prior to the 2003 closure, estimates of fishing revenue are available. An average of 153 unique vessels made rockfish landings using hook-and-line gear within ports adjacent to the 50-fathom isobath of Cordell Bank between 1997 and 2002. During that period, the entire rockfish hook-and-line fishery had an average ex-vessel revenue of approximately $655,828 for the entire study area, of which $191,922 came from inside CBNMS, with an average of $38,347 (20 percent) coming from inside the 50-fathom isobath (Scholz et al. 2005). The importance of this area of interest declined drastically in 2001 and 2002, the first years of what became long-term area- and depth-based closures by NOAA Fisheries that resulted in closures of the bank and much of the Sanctuary. In the unlikely event that the groundfish fishery were to be re-instated, vessels would not be allowed to operate within the 50-fathom isobath of the Bank due to this alternative's prohibition on bottom-contact fishing gear.

Table 3-8 shows the ex-vessel revenues attributed to inside the 50-fathom isobath, as a percentage of total ex-vessel revenues from inside CBNMS waters and from the entire area between Bodega Bay and Pillar Point, respectively. The albacore and salmon fisheries were not affected by the groundfish closure and would not be impacted by this alternative prohibition, since they do not use bottom-contact gear. As is apparent from Table 3-8, neither the squid nor the halibut hook-and-line fisheries operate within the potentially affected area.

Table 3-8
Percent Economic Value of the 50-Fathom Isobath Compared to the Total Value of CBNMS and the Area from Bodega Bay to Pillar Point

Fishery	Cordell Bank	Bodega Bay to Pillar Point
Albacore	**5%**	**0.38%**
Crab	**1%**	**0.03%**
Salmon	**3%**	**0.28%**
Squid	**0%**	**0%**
Halibut Hook and Line	**0%**	**0%**
Rockfish Hook and Line	**20%**	**6%**

Source: Scholz et al. 2005

The crab industry was not affected by the groundfish closures by the PFMC in 2003. While the commercial Dungeness Crab fishery is one of the most important fisheries in central/northern California, very little, if any, crab harvest occurs on Cordell Bank (Scholz et al. 2005). Most commercially harvested crab species require soft bottom habitats -- such as the shelf areas located outside of the 50-fathom isobath in CBNMS. When compared to the study area total, less than 1 percent of the total ex-vessel revenue for the crab fishery originates inside the 50-fathom isobath, whereas 6 percent of the ex-vessel revenue from the rockfish hook-and-line fishery originates inside the 50-fathom isobath (see Table 3-8). When compared to the total ex-vessel revenue inside CBNMS, 5 or less percent of the total ex-vessel revenue for the albacore, crab, salmon

fisheries occur inside the 50-fathom isobath, whereas 20 percent of the ex-vessel revenue from the rockfish hook-and-line fishery comes from inside the 50-fathom isobath.

As described above, the alternative regulation would only apply to a limited type of fishing activity inside the 50-fathom isobath on and around Cordell Bank. While the regulation would restrict using a specific type of gear (and thus a type of fishery) from operating inside the 50-fathom isobath around Cordell Bank, the only existing fishery that is open and that would be potentially affected by this alternative is crab. Because of the very limited use of Cordell Bank and the availability of other suitable fishing grounds for crabbing, the potential adverse impact on the crab fishery would be minor.

The CBNMS regulations issued under this alternative (prohibiting drilling, dredging, or altering, constructing, placing, or abandoning any structure material or matter on the submerged lands) would provide added protection to the benthic habitats in this core area, would prevent a further loss and degradation of habitats, and could reduce some of the potential future spatial displacement inside the 50-fathom isobath around the Bank (in the event that the groundfish closure is lifted) by improving the overall health of the ecosystem of the Sanctuary, including the important habitats on the Bank used as core nursery and spawning areas.

The CBNMS Seabed Protection regulation implemented under this alternative would cause a minor beneficial impact on commercial fishing from habitat enhancement. The prohibition of bottom-contact fishing gear would have very slight adverse effects on existing fishing activities.

Benthic Habitat Protection Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within the line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action, that met the Sanctuary's goals and objectives for protecting the benthic habitats in this area. Under this alternative, in addition to the minor corrections and clarifications, NOAA would issue regulations under the authority of the NMSA prohibiting bottom-contact fishing gear within the 50-fathom isobath around the Bank. In addition, a new definition of bottom-contact fishing gear would be included in the sanctuary regulations. This regulatory alternative would have greater beneficial impacts for fish habitat. In addition, similar to the discussion above regarding the Seabed Protection alternative, the prohibition of bottom-contact fishing gear within the 50-fathom isobath around the Bank would have very slight adverse effects on existing fishing activities.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed; there would be no new impacts on commercial fisheries within the ROI.

3.6.6 Gulf of the Farallones National Marine Sanctuary – Environmental Consequences

The majority of GFNMS regulatory changes in this Sanctuary would not impact commercial fisheries.

The Proposed Action

White Shark Attraction and Approaching

The proposed regulation would prohibit attracting any white shark in the Sanctuary, and approaching any white shark within 2 nm of the Farallon Islands. This proposed change is geared towards eliminating potential impacts from commercial shark viewing enterprises and is not intended to affect commercial fishing activities.

There would be a slight potential for adverse effects on commercial fishing if chumming activities associated with fishing resulted in the accidental attraction of white sharks.

Water Quality – Discharges from Outside the Sanctuary

The proposed regulation would prohibit discharging or depositing any material or other matter from beyond the boundary of the Sanctuary that subsequently enters the Sanctuary and injures a Sanctuary resource or quality. There are some exceptions to this proposed regulation, including discharges for fish, fish parts and chumming. Similar to the general discussion on proposed cross-cutting discharge regulations in Section 3.6.4, this proposed change would have minor beneficial impacts on fish species populations and their respective commercial and recreational fisheries from a decrease in pollution entering and impacting sanctuary resources, including fish. There may be some instances when fishing vessels may need to store wastes that contain harmful matter (as defined in the proposed regulations) and dispose of them onshore or further from the sanctuary, if they could enter the sanctuary and cause injury to sanctuary resources. However, these requirements would have minimal impacts on the fishing industry. Overall, the improvements in water quality and associated benefits to fisheries would have minor beneficial impacts to fisheries.

Deserted Vessels

The proposed regulation would prohibit vessels from being deserted in the Sanctuary, and prohibit leaving harmful matter (hazardous materials or wastes) aboard grounded or deserted vessels in the Sanctuary. This regulation may have some minor adverse impacts on the commercial fishing industry, as it would place an additional economic burden on vessel owners to ensure that a capsized or otherwise incapacitated vessel be salvaged and not abandoned and to ensure that any hazardous substances are removed from an abandoned vessel. However, the intent of this regulation is to ensure that vessel owners take responsibility for their vessels before additional damage can be done to Sanctuary resources. It is far less expensive to a vessel owner to salvage their incapacitated vessel than to pay fines, fees, costs associated with response, damage assessment, and restoration activities should the vessel ground on shore and cause damage to Sanctuary resources. While this may be an immediate burden for the vessel owner, the overall risk of an individual boat being abandoned is relatively small, and the impact on the commercial fishing industry as a whole is considered minor. Reducing the risks of hazards posed by abandoned vessels would have beneficial effects on fisheries and fishing operations and activities.

No-Anchoring Seagrass Protection Zones

As described in Section 3.3 (Biological Resources), seagrasses are particularly important in the sustainability of commercial and recreational fisheries because of their roles in maintaining sediment stability and water quality, and in providing shelter and food critical to their survival. Many species of juvenile fish and crustaceans use seagrasses as nursery areas before moving to other habitats. Seagrass provides spawning substrate for Pacific herring, which hosts a commercial fishery that has an annual spawning biomass average of 3,887 tons (average is based on seasons since the fishery re-opened in 1992). It is also estimated that about 18 percent of the commercial fish and shellfish harvested in California are dependent on estuaries and the wetlands. In 1990, the total value of California wetlands to commercial fisheries production was more than $90 million (Allen et al. 1992). Therefore, protection of this habitat in the designated zones from physical damage caused by anchoring would provide long-term beneficial effects to commercial fish species that use seagrass beds during a portion of their life cycle.

Commercial fishing operations are extremely limited in shallow areas where seagrass is present. The Pacific herring fishery is the only fishery that focuses its operations near or occasionally in seagrass habitat in

Tomales Bay. In late fall, adult herring gradually enter the bay, and build up into large aggregations for several weeks before spawning in seagrass; later spawning adults move into the Bay just before they spawn. The commercial fishery targets female herring for their eggs, which is used in the Asian and American sushi market. Currently the State of California issues 34 limited entry commercial herring gillnet permits in Tomales Bay, which in 2005 had a quota of 400 tons (California Department of Fish and Game, 2006). Fishermen deploy gillnets usually in the channels near seagrass beds when the fish are in the Bay; occasionally they will deploy them in seagrass beds. Gillnets may be anchored to the bottom to keep them from moving with the tide. After a period of time, the fishermen will go over to the net in their vessel, reel in the net, and pick out the caught fish. The proposed prohibition would apply only to the physical act of anchoring a vessel and would not prohibit commercial fishing activities related to the gillnet fishery. While fishermen may anchor their vessel while waiting to retrieve a net, they could conduct this activity in the remaining 78% of the bay that is not included in the no-anchoring zone. They are not required to anchor their vessel to actually engage in the fishery (Mello, 2006). Therefore, the proposed prohibition against anchoring in seagrass would have a negligible adverse effect on the commercial herring fishing.

The only other commercial fishery-related operations in shallow water areas that may include seagrass habitat is mariculture. There are twelve existing mariculture lease holders in Tomales Bay. As part of their operations, it may be required not only to anchor the cages to the seafloor, but also to anchor a vessel when conducting work to seed, maintain, and harvest the shellfish. The proposed regulation to prohibit anchoring a vessel in designated seagrass protection zones specifically excepts existing mariculture operations conducted pursuant to a valid lease, permit, or license. As such, the proposed regulation is not expected to negatively impact existing mariculture operations in the ROI. Overall, this prohibition would result in a net beneficial effect on commercial fishing since it would improve habitats that support many fish species, and not impact existing fishery operations.

Alternative Regulatory Actions

The GFNMS Alternative Regulatory Action regarding white sharks would have the same potential impact on commercial fishing as described for the Proposed Action.

The No Action Alternative

The No Action alternative would maintain the status quo and would not provide any additional restrictions to vessel discharge or create any additional requirements for vessel salvage. However, the No Action alternative would not achieve any of the beneficial effects described for the Proposed Action.

3.6.7 Monterey Bay National Marine Sanctuary–Environmental Consequences

The majority of regulatory changes in this Sanctuary will not have impacts on commercial fisheries.

The Proposed Action

Deserted Vessels

As in GFNMS, the proposed regulation would prohibit vessels from being deserted in the Sanctuary, and would prohibit leaving harmful matter aboard a deserted vessel. The impacts of this proposal would be the same as identified above for GFNMS.

Davidson Seamount

The proposed regulation would include incorporating a rectangular area around the Davidson Seamount in MBNMS and including most of the existing MBNMS sanctuary regulations. The rectangular area would be centered on the top of the Davidson Seamount and consist of approximately 585 square nm (841 square miles; 2,100 square km) of ocean waters and submerged lands thereunder.

The proposed regulation would protect Davidson Seamount from future disturbance or from resource exploitation. The standard MBNMS discharge regulations and seabed disturbance regulations relating to drilling, dredging, seabed alterations, construction, and anchoring would apply in the DSMZ (with certain exceptions). At depths greater than 3,000 feet (914 meters) below the sea surface, the NMSP would prohibit moving, removing, taking, collecting, harvesting, disturbing, breaking, cutting, or other wise injuring Sanctuary resources (or attempting to do those activities), except for fishing, which is prohibited pursuant to the MSA (50 CFR part 660). The Sanctuary would also prohibit the possession of Sanctuary resources taken from below 3,000 feet within the DSMZ, except for the possession of fish resulting from fishing, which is prohibited pursuant to the MSA. The NMSP would rely upon the NOAA Fisheries regulatory amendments to the Groundfish FMP to regulate any fishing-related impacts below 3000 feet. These NOAA Fisheries amended regulations prohibit fishing with dredge gear, beam trawl, certain types of bottom trawl, and bottom contact gear or any other gear that is deployed greater than 500 fathoms (3,000 feet) (71 FR 27408). Therefore fishing would take place in the water column above 3,000 feet but not below it and as such existing fishing activities would not impact the seamount. By incorporating the seamount into MBNMS, its resources, including fish habitats, would be protected. Therefore, the increased level of resource protection provided by this Proposed Action would have minor beneficial impacts on the fisheries of the Davidson Seamount by preventing any type of disturbance or injury to fish or fish habitat.

There are only two commercial fisheries that now operate in the area of the Davidson Seamount, drift gillnetting for swordfish and sharks, and trolling for albacore tuna. These fisheries operate only in the top 164 feet (50 meters) of the water column and would not be affected. It is unlikely that any fisheries would have future interest in the deep habitats (beyond 3,000 feet depth) of the Davidson Seamount.

Designating this area as part of MBNMS would have other minor adverse socioeconomic impacts on the fisheries. Namely, all the discharge restrictions that would apply to the MBMNS would apply to this new area. Compliance with these discharge regulations would not place a substantial burden on commercial fishing operations. The resource protective measures included in the MBNMS regulations, considered collectively, would cause a slight reduction in environmental health risks for fish populations and could result in minor beneficial impacts on these populations. In summary, there would be less than significant adverse economic and operational impacts from this proposed action on commercial fisheries, and minor beneficial impacts on fish populations.

Alternative Regulatory Actions

The alternatives would have the same impacts on fisheries as identified in the Proposed Action, with the following minor differences:

Davidson Seamount NMSA Alternative

Under this alternative, the same geographic area as identified in the Proposed Action would be incorporated into MBNMS as well as the same regulation that would prohibit moving, removing, taking, collecting, harvesting, disturbing, breaking, cutting, or other wise injuring Sanctuary resources (or attempting to do those activities). However, instead of relying on NOAA Fisheries to regulate fishing activities on the Seamount, the

NMSP would issue a regulation, under the authority of the NMSA, prohibiting all fishing below 3,000 feet (914 meters). This alternative would be implemented if NOAA Fisheries did not impose restrictions on fishing in water depths greater than 3,000 feet (914 meters) below the surface that met the Sanctuary's goals and objectives for protecting the benthic habitats in this area. This regulatory alternative would have greater beneficial impacts for biological resources than described for the Proposed Action since, in addition to the benefits listed in the Proposed Action, the alternative would also directly regulate impacts to biological resources, including fish and fish habitat, resulting from the use of bottom contacting fishing gear on Davidson Seamount. This regulatory alternative would potentially have slightly greater beneficial impacts for fisheries resources than described for the Proposed Action since, in addition to the benefits listed in the Proposed Action, it would directly regulate impacts on biological resources, including fish and fish habitat, resulting from the use of bottom-contact fishing gear on Davidson Seamount. However, the beneficial impacts would be the same as the Proposed Action if the NOAA Fisheries regulations that prohibit bottom-contact gear on Davidson Seamount are considered. In addition, because no commercial fisheries currently operate at that depth, the impacts associated with this alternative would be the same as under the Proposed Action.

Davidson Seamount Circular Boundary Alternative

The Project Alternative would delineate the Davidson Seamount with a circular boundary and would include a greater area. This would result in slightly greater restrictions than the Proposed Action. The impacts would be the same as those described above for the Proposed Action, but the adverse impacts from the alternative may be slightly increased.

The No Action Alternative

The No Action alternative would maintain the status quo and would not make any additional requirements for vessels left adrift or include the Davidson Seamount in MBNMS. This would result in no impact on commercial fisheries.

3.6.8 Cumulative Impacts

Most of the cumulative actions analyzed here that may affect the commercial fishery (described below) relate to the amendments to or establishment of new fisheries management plans by the PFMC or the Department of Fish and Game. In general, these actions are intended to benefit commercial fish species populations, but they may have adverse economic, operational, or social impacts on the commercial fishing industry.

The CDFG manages sport and commercial fisheries within state waters, and all fisherman licensed by the state of California. Such management activities include the management of species off-limits to commercial fishing, permit requirements and fees for certain fisheries, gear restrictions for certain fisheries, and commercial licenses and other administrative requirements. CDFG regularly updates fishery regulations and periodically updates the few fishery management plans it currently has. For example, the Pacific herring commercial fishery regulations are updated on an annual basis. Further, the Fish and Game Commission and the NMFS may propose new or amended regulations every year regarding, for example, fishing gear, total allowable catch or specific restrictions for specific fisheries, and trip limits (CDFG 2004a). Under the authority of the California Marine Life Management Act and other legislation, the Fish and Game Code prohibits commercial fishing for several dozen species, including scallops, krill, white sharks, garibaldi, and marlin (California Fish and Game Commission 2006).

The PFMC is required to amend its management plans on a regular basis. For example, the PFMC is required to update its Groundfish FMP every two years and its harvest specifications on a yearly basis. As described

above under Regulatory Environment, NOAA Fisheries is implementing Amendment 19 to the Groundfish FMP that imposes additional restrictions on fishing within the ROI, in order to preserve groundfish populations. The Salmon Fishery Management Plan requires that spawner escapement goals and harvest allocation quotas be set on a yearly basis. The Coastal Pelagic Species Management Plan requires that harvest guidelines for Pacific mackerel and Pacific sardine be set annually as well (PFMC 2000).

These agencies intend the new and amended fisheries management plans to benefit the commercial fisheries as a whole through sustainable management. Individual fisheries may experience the management plans and related regulations as adverse impacts when they are prohibitively restrictive to an economically viable fishery. However, as a whole, commercial fisheries receive beneficial impacts from the fisheries management tools employed by state and federal government because of the overall protections afforded to fish species, resulting in sustained or increased population levels and subsequently, sustained potential harvests.

Implementation of the FMPs will contribute to the ROI's regional ecosystem health, including water quality, by applying the various protective action plans in CBNMS, GFNMS, and MBNMS. Cross-cutting management associated with ecosystem monitoring will provide a better understanding of fish populations along coastal northern/central California and what, if any, improvements in ecosystem management could be made. GFNMS and MBNMS action plans specific to water quality would have similar beneficial impacts. Such action plans would include the Estuarine and Nearshore Environments, Open Coastal Environment, and Additional Areas action plans in GFNMS and the Beach Closures and Microbial Contamination, Cruise Ship Discharges, and Water Quality Protection Program Implementation action plans in MBNMS. The Vessel Spill action plan would also have a beneficial impact on water quality within GFNMS by managing the likelihood of such spills and the effectiveness of spill responses. The MBNMS Desalination, Harbors and Dredge Disposal, and Cruise Ship Discharges action plans would provide beneficial impacts on water quality by imposing restrictions on discharges. Beneficial effects on marine water quality can result in indirect beneficial effects on fish habitat and commercial fish species. These improvements would benefit the long-term viability of fishing operations along the northern/central California coast.

The Proposed Action

The Proposed Action would have a mix of minor adverse and minor beneficial cumulative impacts on the commercial fishing industry. Increased restrictions on activities in sanctuary waters would decrease fishing opportunities and increase burdens on commercial fishing operations; however, the protections conferred to the species within these waters would allow these populations to thrive, ensuring the longevity of the fishing resources for the future, and in adjacent waters that are not subject to the same restrictions. The Proposed Action would therefore contribute to both cumulative beneficial and cumulative adverse impacts on commercial fisheries.

Alternative Regulatory Actions

Under the alternatives, cumulative impacts would be the same as those described under the Proposed Action.

The No Action Alternative

The No Action alternative would maintain the status quo of sanctuary management. No additional resource protection from proposed regulations would occur. There would also be cumulative beneficial trends on commercial fisheries from existing regulation and management efforts, including implementation of the FMPs and the NOAA Fisheries groundfish regulations, which would help protect fish species populations. The No Action alternative would not contribute to either cumulative adverse or cumulative beneficial trends.

3.7 CULTURAL AND MARITIME HERITAGE RESOURCES

Cultural resources are defined as any historical or cultural feature, including archaeological sites, historic structures, shipwrecks, and artifacts. Historical resources are defined as any resources possessing historical, cultural, archaeological or paleontological significance, including sites, contextual information, structures, districts, and objects significantly associated with or representative of earlier people, cultures, maritime heritage, and human activities and events. Historical resources include "submerged cultural resources," and also include "historical properties," as defined in the National Historic Preservation Act (NHPA), as amended, and its implementing regulations, as amended.

Submerged cultural resources can be defined loosely as archaeological or culturally significant sites over fifty years old that are located underwater. These sites may include shipwrecks, downed airplanes, or submerged structures within the more recent historic period, or may include harder to identify sites dating to the prehistoric period consisting of campsites with stone tools or stones used for grinding.

3.7.1 Regional Overview of Affected Environment

The cultural background for the project area can be separated into three broad categories. Precontact history describes events prior to European exploration and influence in the Americas. Ethnohistory represents information gleaned from ethnographic sources (including oral histories and anthropological and sociological studies) and historical accounts of Native American groups within the project area. History is generally post-contact information gathered from written documents from the time of early European exploration until today.

It is generally believed that human occupation of the West Coast dates back to at least 10,000 years before present (BP). Several sites around California are thought to have been occupied between 40,000 to 200,000 years BP; however, the reliability of the dating techniques used and the validity of the artifacts found in those sites remain controversial (Moratto 1984). It is widely held that prehistoric shorelines extended far out onto the Continental shelf, and it is probable that the remains of California's earliest settlements were inundated following the last Ice Age. Archaeological evidence for occupation of California during the Holocene Epoch (10,000 years BP to present) is stronger.

By the late 1500s Spain had established a regular pattern of trade from the Philippines across the Pacific. Reaching the west coast at points around Oregon, the *Manila Galleons* would sail south along the coast to Acapulco (Marken 1994). One such early expedition was that of the ill-fated *San Augustin* in 1595, which is California's earliest recorded shipwreck. A Manila Galleon on her way to Acapulco with a load of Chinese trade porcelain, the galleon anchored in what is now Drakes Bay. While most of the crew was ashore, a quick change in wind and a fierce gale wrecked the *San Augustin*. It is not known whether the *San Augustin* is located in GNMS or in Point Reyes National Seashore.

It is interesting to note that San Francisco Bay was virtually invisible to the early Spanish explorers due to the relatively small entrance of the bay, the regular presence of fog off the coast, and the fact that the hills at the eastern end of the bay at Berkeley seem to merge with the Marin and San Francisco shores. Although the Manila trade had been in place for a few decades, it was not until 1602 that Sebastian Vizcaino landed at present day Monterey, which he named. Given the huge Spanish occupation in present day Mexico and other expeditions that may have preceded Vizcaino, it is probable that the European presence was known by the Native Americans living along the coast.

Following Vizcaino's landing, other Spanish ships may have stopped at Monterey, but Spanish presence was limited. Nearly one hundred and seventy years later, an overland expedition in 1769 led by Gaspar de Portola would discover many of California's hidden features, including San Francisco Bay. To the south he would found the city of Monterey in 1769, and following Portola, Padré Junipero Serra would create the Mission San Carlos de Borromeo in 1770. While Portola's expedition would follow the coast, subsequent exploration by Pedro Fages in 1770 and 1772, Fernando Javier de Rivera in 1774, and Juan Bautista de Anza in 1776 was conducted on the east side of the Santa Cruz Mountains, along a route which became known as El Camino Real.

As the influx of Euro-Americans continued, ports, such as San Francisco and Monterey, and smaller coastal harbor towns developed through fishing, shipping, and economic exchange. Regional fishing communities dating back to the middle of the 19th century are distinctive for their rugged, individualistic culture born of a hard and sometime dangerous life harvesting fish at sea (NOAA 2003c, 2003d, 2003e). The fishing boats, fish houses, and other parts of the fishery infrastructure lend to the character of the West Coast sanctuaries, as does the knowledge possessed by working men and women of the ocean waters they ply for their livelihoods (NOAA 2003c, 2003d, 2003e).

The area encompassed by the three sanctuaries is rich in cultural and archaeological resources and has a long and interesting maritime history. Ocean-based commerce and industries (e.g., fisheries, extractive industries, export and import, and coastal shipping) are important to the maritime history, the modern economy, and the social character of this region (NOAA 2003c, 2003d, 2003e).

The NMSA mandates the management and protection of submerged archaeological sites. Therefore, the NMSP is identifying submerged heritage resources and developing education and preservation plans regarding these resources. Program efforts include conducting paleo-ecological and archaeological studies; inventorying, locating, and monitoring both historic shipwrecks and those that pose an environmental threat to sanctuary marine resources; and characterizing and protecting heritage resources. Records indicate that over 600 vessel and aircraft losses were documented between 1595 and 1950 along California's Central Coast from Cambria north to Bodega Head, including the Farallon Islands. Approximately 173 of those documented are in GFNMS, 463 are in MBNMS (Smith and Hunter 2001), and none to date are within CBNMS (NOAA 2003c, 2003d, 2003e). There is only one vessel listed under the National Register of Historic Places. It is the *Tennessee*, a California Gold Rush side-wheel passenger steamer, the sunk in 1853 in the MBNMS just north of the Golden Gate Bridge.

Some of the above-recorded sites have been located and inventoried by NOAA and the National Park Service in the GFNMS region. GFNMS and MBNMS have also collaborated with state and federal agencies and the private sector to gather resource documentation and to create opportunities to locate and record submerged archaeological resources (NOAA 2003d, 2003e). MBNMS recently directed completion of a shipwreck inventory from established shipwreck databases and review of primary and secondary source documentation, entitled *MBNMS Submerged Cultural Resources Study* (Smith and Hunter, 2001). These studies provide a foundation for an inventory of the historic resources in the sanctuaries.

GFNMS is identifying and monitoring historic and non-historic shipwrecks that may pose environmental threats to marine resources. Many vessels may contain hazardous cargo, abandoned fuel, and unexploded ordnance. These sunken vessels are slowly deteriorating in a corrosive marine environment. For instance, one of the shipwrecks of concern is the *Jacob Luckenbach*, which contains Bunker-C fuel oil. Up to 25,000 common

murres, grebes and cormorants were killed in 2001 by extensive tar balls from this ship (Smith and Hunter 2001). In 2002, the U.S. Coast Guard contracted the removal of 85,000 gallons of fuel from this vessel (NOAA 2003d).

3.7.2 Regulatory Environment

Cultural and historical resources are regulated through a number of federal laws, as summarized below. Sanctuary and California State regulations prohibit disturbance of submerged archaeological and historical resources, except by permit. The NMSP and California State Lands Commission have an archaeological resource recovery permit system in place.

The National Historic Preservation Act (NHPA) (16 U.S.C. § 470 et seq.) serves as the basis for a process that considers the effects of federal undertakings on cultural and historic resources. The procedure an agency takes to achieve compliance with this legislation is commonly called the Section 106 process. Although the NHPA was created primarily in response to numerous federally funded urban renewal projects that demolished old neighborhoods and historic homes, it applies to any actions an agency may take that would affect historic or cultural resources as they are defined in the law. The intent of the process is to require the federal agency, in consultation with other affected parties, to make an informed decision as to the effect its actions would have on something that may be important to our heritage.

Depending on the resources identified, the following legislation could also apply within the sanctuaries:

National Historic Preservation Act of 1966, 16 U.S.C. §§ 470-470x-6

Cultural resources on federal lands are protected primarily through the NHPA of 1966 and its implementing regulations (found at 36 CFR Part 800). Section 106 of the NHPA requires federal agencies to identify and evaluate the effects of their actions on properties listed in or eligible for listing in the National Register of Historic Places (NRHP). Consultation with the State Historic Preservation Officer, Native American tribes, native Hawaiian organizations, the Advisory Council for Historic Preservation, and other interested parties is part of the regulatory process. To be protected under the NHPA, a property must meet specific criteria of significance established under the NHPA's regulations at 36 CFR Part 60.

Archaeological Resources Protection Act of 1979, 16 U.S.C. §§ 470aa – 470mm

This act requires all archaeological excavations on federal land to be undertaken pursuant to permit issued by the federal land manager. This act also imposes criminal penalties for unauthorized excavations.

Native American Graves Protection and Repatriation Act of 1990, 25 U.S.C. §§ 3001-3013

This act requires federal agencies to identify and inventory possible Native American, native Alaskan, or native Hawaiian human remains, burial goods, or cultural items in their collections and to make them available for repatriation to affiliated tribes or lineal descendants. The act also establishes procedures for handling and disposing of such remains, burial goods, or cultural items discovered on federal lands.

Abandoned Shipwreck Act of 1987, 43 U.S.C. §§ 2101-2106

This act asserts federal ownership over certain shipwrecks found in state waters (within the 3-mile line) and transfers ownership of those resources to the states. Shipwrecks in federal waters remain under the jurisdiction of the federal government.

Antiquities Act of 1906, 16 U.S.C. §§ 431-433

This act requires a permit to excavate or remove any historic objects or antiquities from federal lands, and grants the President the authority to designate as national monuments landmarks of historic or scientific importance. The permit provisions of the Antiquities Act are generally are enforced through the NHPA process.

Historic Sites, Buildings, Objects, and Antiquities Act of 1935, 16 U.S.C. §§ 461-467

This act establishes the national policy of preserving historic resources and gives the Secretary of the Interior the power to make historic surveys and document, evaluate, acquire, and preserve archaeological and historic sites across the country. This act provided the authority behind the establishment of the National Historic Landmarks and Historic American Buildings Survey programs.

3.7.3 Significance Criteria and Impact Methodology

Cultural resources must meet certain federal criteria to be considered a significant historic resource. The following significance criteria are the basis for determining inclusion of a property on the NRHP (36 CFR 60.4). The property must have or be the following:

- Association with events that have made a significant contribution to the broad patterns of our history;
- Association with the lives of persons significant to our past;
- Resources that embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master or that possess high artistic values or that represent a significant and distinguishable entity whose component may lack individual distinction; or
- Resources that have yielded, or may be likely to yield, information important in prehistory or history.

Pursuant to the NHPA and its implementing regulations, an undertaking has an effect on a historic property when it alters those characteristics of the property that qualify it for inclusion in the NRHP. An undertaking is considered to have an adverse effect on a historic property when it diminishes the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects include, but are not limited to, the following:

- Physical destruction, damage, or alteration of all or part of the property;
- Isolation of the property or alteration of the character of the property's setting when that character contributes to the property's qualifications for the NRHP;
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or changes that alter its setting;
- Neglect of a property resulting in its deterioration or destruction; and
- Transfer, lease, or sale of a property without adequate provision to protect the property's historic integrity.

The Proposed Action would have a significant adverse effect on a historic property if its implementation would alter those characteristics of the property that qualify it for inclusion on the NRHP.

Native American sites (whether they are considered NRHP-eligible or not) may also be protected under the American Indian Religious Freedom Act of 1978 and the Native American Graves Protection and Repatriation Act of 1990.

An action that may alter any characteristic of a resource that contributes to its importance to Native Americans would be considered to have a significant effect on that resource. The significance of an effect to a Native American resource is determined based on the importance of the resource to Native American groups and the type of effect the project would have. These effects may include changes to the resource itself or to its setting.

The overall methodology is consistent with CEQ guidance and NOAA NEPA guidelines (NAO 216-6).

3.7.4 Cross-cutting Regulations –Environmental Consequences

There are no adverse impacts on cultural resources associated with the cross-cutting regulations.

The Proposed Action

Introduced Species

The proposed introduced species regulation could provide a beneficial impact on cultural resources. Introduced species tend to proliferate in their new habitats, as has been seen with zebra mussels in the Great Lakes region of North American (Cataraqui Archaeological Research Foundation 2006; Watzin, Cohn and Emerson 2001). In this case, the invasive species has colonized the surfaces of shipwrecks and other submerged cultural resources and when they are removed the surfaces are damaged. As such, they prevent detailed study of the resources. Implementing regulations to restrict the introduction of invasive species would reduce the likelihood of such threats to cultural resources in the three sanctuaries and provide benefits to cultural resources.

Alternative Regulatory Actions

There are no cross-cutting alternatives that would impact cultural resources.

3.7.5 Cordell Bank National Marine Sanctuary –Environmental Consequences

The Proposed Action

Seabed Protection

The Proposed Action would have a beneficial effect on cultural resources because this would prohibit drilling, dredging, or altering, constructing, placing, or abandoning any structure material or matter on or in the submerged lands within the line representing the 50-fathom isobath surrounding Cordell Bank. Any of these activities could potentially disturb, injure, or damage submerged and cultural resources. In addition, NOAA Fisheries prohibits bottom-contact fishing within the 50-fathom isobath around the Bank, thus helping to protect any unidentified cultural resources in that area from accidental disturbance. Overall, this proposed regulation would result in a minor beneficial impacts to cultural and maritime resources, however, at this time there are no cultural resources identified in the Sanctuary.

Benthic Habitat Protection

The proposed clarifications to the Cordell Bank benthic habitat regulation will have the same amount of protection as the existing regulation and would result in negligible impacts on cultural resources.

Alternative Regulatory Actions

Seabed Protection Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within the line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action, that met the Sanctuary's goals and objectives for protecting the benthic habitats in this area. This provision would result in the same beneficial impact on cultural resources as the Proposed Action, although through action by the NMSP rather than NOAA Fisheries. Because no cultural resources have been identified in CBNMS, this alternative would result in the same minor beneficial impact on cultural resources as the Seabed Protection regulation in the Proposed Action.

Benthic Habitat Protection

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within a line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action. It would result in the same minor beneficial impact on cultural resources as the Benthic Habitat Protection regulation in the Proposed Action.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed; this would result in no impact on cultural resources in the Sanctuary. Under the No Action alternative, the potential benefits of the proposed introduced species regulation would not be achieved.

3.7.6 Gulf of the Farallones National Marine Sanctuary –Environmental Consequences

The Proposed Action

Cultural Resources

The Proposed Action modifies the regulatory wording regarding removing or damaging historical or cultural resources. The proposed regulatory language differs from the original regulation primarily by adding prohibitions on "possessing, moving or injuring" or "attempting to move, remove or injure" a Sanctuary historical resource. The changes make the regulation consistent with newer language for other Sanctuaries. Historical resources in the marine environment are fragile, finite and non-renewable. This prohibition is designed to protect these resources so they may be researched and information about their contents and type made available for the benefit of the public. Although primarily technical in nature, this proposed change would result in a beneficial impact on cultural resources by expanding the prohibition to provide more comprehensive protection of the resource.

Deserted Vessels

The proposed regulations would prohibit abandoning vessels within the Sanctuary, or leaving harmful materials on such abandoned or grounded vessels. Fuel and oil spills from grounded vessels could damage historic submerged ship or airplane wrecks. By prohibiting vessel owners from deserting their vessels and by requiring the removal of harmful materials from abandoned vessels, the proposed action would reduce the

risk of groundings and spills from deserted vessels. Therefore, the proposed action would have the potential to improve protection for submerged cultural resources. This improved protection is considered a beneficial effect.

Alternative Regulatory Actions

There are no alternatives for GFNMS that would impact cultural resources.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on cultural resources. The beneficial effects identified for the Proposed Action would not be achieved under the No Action alternative.

3.7.7 Monterey Bay National Marine Sanctuary–Environmental Consequences

Proposed Action

Davidson Seamount

The proposed regulation would protect Davidson Seamount, including any cultural or historic resources, from future disturbance or from resource exploitation. The standard MBNMS discharge regulations and seabed disturbance regulations relating to drilling, dredging, seabed alterations, construction, and anchoring would apply to the DSMZ (with certain exceptions). At depths greater than 3,000 feet below the sea surface, the NMSP would prohibit moving, removing, taking, collecting, harvesting, disturbing, breaking, cutting, or other wise injuring (or attempting to do those activities) Sanctuary resources (including historic and cultural resources), except for fishing, which is prohibited pursuant to the MSA (50 CFR part 660). The Sanctuary would also prohibit the possession of Sanctuary resources taken from below 3,000 feet within the DSMZ, except for the possession of fish resulting from fishing, which is prohibited pursuant to the MSA. The NMSP would rely upon the NOAA Fisheries regulatory amendments to the Groundfish FMP to regulate any fishing-related impacts below 3,000 feet. These NOAA Fisheries amended regulations prohibit fishing with dredge gear, beam trawl, certain types of bottom trawl, and bottom contact gear or any other gear that is deployed greater than 500 fathoms (3,000 feet) (71 FR 27408). Adding Davidson Seamount to MBNMS would benefit cultural resources that may be submerged in the area because it would give them the same protection as other historic and cultural sites within the current MBMNS. The Proposed Action would result in a beneficial impact on cultural resources at Davidson Seamount.

Dredge Disposal

Defining the Moss Landing dredge disposal site and the Santa Cruz and Monterey sites would have a slight beneficial effect on cultural resources, if there are cultural resources in the vicinity of the existing disposal areas. Strict and precise dumpsite parameters would lessen the chance of accidental destruction of cultural resources that could result from disposing of dredge spoils in the wrong location. Therefore, the regulation would have slight beneficial impacts on cultural resources.

Deserted Vessels

As described for GFNMS, these proposed regulations would have the potential to improve protection for submerged cultural resources from broken-up vessels or from resulting hazardous spills. This improved protection is considered a beneficial effect.

Alternative Regulatory Actions

The only alternative for MBNMS that would impact cultural resources is the alternative configuration for inclusion of Davidson Seamount.

Davidson Seamount Circular Boundary Alternative

This alternative would provide the same beneficial effects on cultural resources as the proposed action, but would cover a larger geographic area.

Davidson Seamount NMSA Alternative

This alternative would be implemented if NOAA Fisheries did not implement bottom-fishing regulations at Davidson Seamount that met the Sanctuary's goals and objectives for protecting the benthic habitats in this area.. The ultimate effect on cultural resources would be the same as described for the Proposed Action.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on cultural resources. However, the beneficial effects identified for the Proposed Action would not be achieved.

3.7.8 Cumulative Impacts

The overall trend with regard to cultural resources is an increase in legislative and legal protections, counteracted by increased development onshore and increased scavenging offshore, leading to destruction or damage to these resources. Submerged cultural resources are more difficult to protect because of their remote locations than terrestrial resources are, regardless of their legal status. Cumulative projects that might affect cultural resources in the project area include seawall and other shoreline-hardening projects in GFNMS and MBNMS, construction projects along the shoreline, and pipeline and cable-laying in MBNMS.

Implementation of the FMPs will contribute to the ROI's regional ecosystem health, including cultural resources, by applying the various action plans in CBNMS, GFNMS, and MBNMS. Cross-cutting action plans such as the Community Outreach and Maritime Heritage management will better inform the public and Sanctuary staff about the cultural heritage of CBNMS, GFNMS, and MBNMS. An Education and Outreach action plan will further develop this knowledge for CBNMS cultural resources, as will Education and Outreach and Research and Monitoring programs at GFNMS and Interpretive Facilities and Multicultural Education programs at MBNMS. Action plans concerning introduced species at GFNMS and MBNMS will also aid in the preservation of submerged cultural resources within those sanctuaries by limiting the possibility of damage by species that colonize on the resources. Additionally, NOAA Fisheries is implementing regulatory amendments to the Groundfish FMP that imposes additional restrictions on fishing within the ROI, in order to preserve groundfish populations. These restrictions would help prevent damage to submerged cultural resources from trawl equipment and other fishing gear.

Proposed Action

Ongoing regulatory efforts, including implementation of the FMPs and the NOAA Fisheries regulations restricting bottom-contact fishing, would create a beneficial cumulative impact on cultural resources. Some ongoing adverse impacts would continue (such as coastal development and scavenging activities); these would continue to be part of ongoing adverse cumulative trends within the ROI. The Proposed Action, through limiting or preventing seabed disturbance and better defining preservation measures, would contribute to this

beneficial cumulative effect on cultural resources, and would help mitigate any adverse cumulative trends caused by coastal development and scavenging.

Alternative Regulatory Actions

The alternatives would have a slightly greater cumulative beneficial effect than the Proposed Action by including a larger area of protection around Davidson Seamount.

The No Action Alternative

The No Action alternative would maintain the status quo of sanctuary management. No additional protections for cultural resources would be provided. Some ongoing adverse impacts would continue (such as coastal development and scavenging activities); these would continue to be part of ongoing adverse cumulative trends within the ROI. There would also be cumulative beneficial impacts on cultural resources from existing regulation and management efforts, including implementation of the FMPs and the NOAA Fisheries regulations restricting bottom-contact fishing. The No Action alternative would not contribute to any cumulative impacts, either beneficial or adverse.

3.8 HAZARDOUS WASTES AND WASTE DISPOSAL

This section addresses issues related to the proposed action that are associated with hazardous waste or waste disposal. The Resource Conservation and Recovery Act (RCRA) specifically defines a hazardous waste as a solid waste (or combination of wastes) that due to its quantity, concentration, or physical, chemical, or infectious characteristics can cause or significantly contribute to an increase in mortality. RCRA further defines a hazardous waste as one that can increase serious, irreversible, or incapacitating reversible illness or pose a hazard to human health or the environment when improperly treated, stored, disposed of, or otherwise managed. A solid waste is a hazardous waste if it is not excluded from regulation as a hazardous waste or if it exhibits any ignitable, corrosive, reactive, or toxic characteristics (USEPA 1999).

The ROI for these issues includes the CBNMS, GFNMS, and the MBNMS. Additionally, the ROI includes the area around Davidson Seamount proposed for inclusion in MBNMS and the near-coastal onshore environment along approximately 400 miles (645 km) of shoreline (about one-third of the California coast) located in central and northern California adjacent to the sanctuaries.

3.8.1 Regional Overview of Affected Environment

There are four topics of concern having to do with hazardous waste and waste disposal within and adjacent to the three sanctuaries and the Davidson Seamount area: marine vessel discharge, cruise ship discharge, dredge disposal, and the Comprehensive Environmental Response, Compensation, and Liability Information System/ National Priorities List (CERCLIS/NPL) sites. Each topic is described in detail below.

Marine Vessel Discharges (excluding Cruise Ships)

Marine vessels generate pollutants that are commonly discharged in the water. These potentially hazardous pollutants include, but are not limited to, oil, hydrocarbons, volatile organic compounds (VOCs), and sewage. The marine vessels include a wide array of boats and MPWC and are used in both commercial and recreational activities. Specific types of marine vessel discharges are described in Section 3.5, Water Quality.

Cruise Ship Discharges

The main pollutants generated by a cruise ship are sewage, also referred to as black water; gray water; oily bilge water; hazardous wastes; and solid wastes. A recent California law (State of California Legislature, Assembly Bill 2672) prohibits the discharge of treated or untreated sewage from cruise ships into state waters (from the shoreline to 3 nm [3.5 miles; 5.5 km] offshore).

Graywater from vessels includes wastewater from kitchens, showers, laundry facilities, and galleys. Pollutants in graywater include suspended solids, oil, grease, ammonia, nitrogen, phosphates, copper, lead, mercury, nickel, silver and zinc, detergents, cleaners, oil and grease, metals, pesticides, and medical and dental wastes. Federal regulations do not currently prohibit the discharge of graywater in the sanctuaries (NOAA 2003c, 2003d, 2003e). A recent California law (State of California Legislature, *Assembly Bill 2093*) prohibits the discharge of graywater from cruise ships into state waters (from the shoreline to 3 nm [3.5 miles; 5.5 km] offshore). Details on the types of discharges associated with cruise ships and existing discharge regulations are provided in Section 3.5, Water Quality.

Hazardous wastes specifically produced on cruise ships include by-products of dry cleaning and photo processing operations, paints and solvents, batteries, fluorescent light bulbs containing mercury, and wastes from print shops. A typical ship produces an estimated 110 gallons (416 liters) of photo processing chemicals,

5 gallons (19 liters) of dry cleaning wastes, and 10 gallons (38 liters) of used paints per week. These substances can be toxic or carcinogenic to marine life (NOAA 2003c, 2003d, 2003e).

The RCRA imposes management requirements on cruise ships and other vessels that generate or transport hazardous waste and requires that hazardous materials be offloaded to land-based treatment or disposal facilities (NOAA 2003c, 2003d, 2003e).

Dredge Disposal

Local harbors regularly dredge harbor bottoms and dispose of the bulk of their dredge sediments either in the ocean, on land at landfill sites, or at designated beach nourishment sites adjacent to the harbors. Dredge materials can contain a variety of hazardous materials including mercury and other heavy metals, chlorinated pesticides, polychlorinated biphenyls (PCBs), and PAHs.

Two existing dredge disposal sites, SF-12 and SF-14 (see Figure 2-5) within MBNMS are formally recognized in the MBNMS regulations. Two additional sites that predate the MBNMS regulations are within MBNMS at Santa Cruz Harbor and Monterey Harbor. Details on dredge disposal sites are provided in Section 3.5, Water Quality.

Before dredged material can be disposed of, a Sampling and Analysis Plan (Plan) is prepared and reviewed by the USEPA, the US Army Corps of Engineers, California Coastal Commission and NOAA. Under the plan, the material is tested for contaminants under the CWA, and it is determined whether the material is suitable for unconfined aquatic disposal. If the material to be dredged is contaminated, as indicated by the testing results, and there is not an inland location or landfill option identified, than the sediments will not be able to be dredged (Morton 2004). For this reason, all dredged material that is disposed of in the sanctuary meets the thresholds of the Clean Water Act and is evaluated in the water quality section (Section 3.5) of this document.

Superfund Sites

There are no superfund sites located offshore of the California coastline that fall within the boundaries of the sanctuaries or Davidson Seamount. The closest superfund site to the coastline is at Fort Ord in Monterey County; however the groundwater contamination from this site does not extend to the coastline.

3.8.2 Regulatory Environment

Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9610

The CERCLA, commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. The Superfund Amendments and Reauthorization Act (SARA) amended CERCLA on October 17, 1986. Superfund is the federal government's program to clean up the nation's uncontrolled hazardous waste sites.

The CERCLIS contains information on hazardous waste sites, potential hazardous waste sites, and remedial activities across the nation, including sites that are on the National Priorities List (NPL) or being considered for the NPL. CERCLIS contains information on sites located within the shoreline counties of the ROI. There are four CERCLIS sites within Santa Cruz County, including one NPL site; eleven CERCLIS sites and one

NPL site are within San Francisco County; three CERCLIS sites are within Marin County; six CERCLIS sites, including three NPL sites, are within Monterey County; twenty-seven CERCLIS sites, including two NPL sites, are within Sonoma County; one CERCLIS site is within San Luis Obispo County; and ten CERCLIS sites are within San Mateo County.

Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901-6992

The RCRA addresses hazardous waste management, establishing duties and responsibilities for hazardous waste generators, transporters, handlers, and disposers.

Clean Water Act, 33 U.S.C. § 1251 et seq.

Section 312 of the CWA requires the use of MSDs for all vessels within 3 nm (3.5 miles; 5.5 km) offshore; raw sewage can be legally discharged beyond 3 nm. Vessels over sixty-five feet in length must have a Type II or Type III MSD. In the sanctuaries, the discharge of raw sewage is prohibited, and it is required that properly functioning marine sanitation devices be used when discharging sewage waste (NOAA 2003c, 2003d, 2003e).

3.8.3 Significance Criteria and Impact Methodology

Criteria to determine the significance of impacts associated with regulatory changes to hazardous waste management practices are based on federal and state regulations. Impacts are considered to be significant if the Proposed Action were to:

- Increase the likelihood of activities that would violate the Resource Conservation and Recovery Act, 42 U.S.C. § 6901, or NOAA hazardous waste handling or waste disposal guidelines;
- Increase the discharge or deposition of unauthorized waste into the sanctuary or in an area outside the sanctuary that could migrate into the sanctuary and affect its resources (including onshore urban or agricultural runoff);
- Increase the generation of hazardous or acutely hazardous waste, resulting in increased regulatory requirements over the long term;
- Increase the likelihood of exposing the environment or the public to any hazardous conditions through release or disposal;
- Increase the likelihood of activities that would cause physiochemical changes that affect the marine ecosystems or are measurably different from ambient background conditions;
- Increase the likelihood for spills or releases of oil, fuel, or hazardous substances from operations, such as commercial shipping, within the sanctuaries; or
- Cause oil, grease, or other waste material to be visible.

Although the ROI for hazardous waste and waste disposal encompasses three marine sanctuaries and the Davidson Seamount area, as well as the onshore environment adjacent to the sanctuaries, regulations for waste-related impacts are relatively uniform, with additional NOAA regulations incorporated for offshore operations. The central objective is to protect the environment of the sanctuaries from hazardous waste or waste disposal impacts. The impact analysis focuses on determining whether any of the proposed or alternative regulatory actions could result in practices that would increase the potential for hazardous waste generation or hazardous waste disposal. The analysis included assessing the compliance of the Proposed

Action with applicable federal or site-specific hazardous or nonhazardous waste regulations, guidelines, management plans, spill response and contingency plans, and pollution prevention plans.

Neither the Proposed Action nor any of the alternatives would impact the USEPA cleanup of hazardous waste sites on land under the USEPA Superfund Program because most of the regulatory changes address offshore habitat. In addition, the Superfund Program is not expected to impact the new management measures identified under the Proposed Action because the program is regulated by the USEPA and focuses on containment within each site. Therefore, the impact analysis does not address superfund sites. The analysis addresses how the proposed action affects disposal of hazardous waste in the sanctuaries and the Davidson Seamount area.

3.8.4 Cross-Cutting Regulations – Environmental Consequences

The Proposed Action

The proposed cross-cutting actions would result in beneficial effects, with regard to hazardous waste disposal in the ROI.

Introduced Species

The proposed regulation would prohibit the release of introduced species into the three sanctuaries. Introduced species have the potential to alter ecosystem composition and function, and their introduction can indirectly impact water quality, including hazardous wastes. An example of a non-native species affecting water quality toxicity is the Asian clam (*Potamocorbula amurensis)*, in the San Francisco Bay Estuary. This species concentrates selenium at a much higher rates than any native species, negatively affecting higher trophic organisms that bioconcentrate this contaminate. Oil refineries in the region have spent large sums of money extracting selenium from the ecosystem (SFBRWQCB 2000).

Implementing regulations to reduce the number of nonnative species introduced into the sanctuaries could reduce the discharge of waters that may also contain hazardous materials and wastes. There is currently no language in existing sanctuary regulations with regards to introduced species, though the State of California prohibits the introduction of nonnative species in their waters. The proposed prohibition would result in consistent regulations throughout state and federal waters of the three sanctuaries regarding the introduction of nonnative species. Overall, the proposed prohibition would have a potentially beneficial impact on the management of hazardous waste and waste disposal throughout the ROI.

Discharge Regulation Clarifications, Marine Sanitation Devices, and Graywater

Amending the language regarding allowable discharges would provide a beneficial impact on the management of hazardous waste and waste disposal since the amendments would further clarify that the discharge of untreated sewage is prohibited in the sanctuaries. Large vessels (300 gross tons) would no longer be allowed to discharge or deposit treated sewage, and graywater in the MBNMS, into the sanctuaries, if they have sufficient holding capacity. For vessels under 300 gross tons or larger vessels without sufficient holding capacity, the proposed regulations allow discharges into the sanctuaries from MSD types I and II, but do not allow discharges from Type III MSDs, which essentially is raw sewage. Additionally, the proposed regulation of requiring locks on valves preventing bypass and direct discharge of untreated sewage is meant to facilitate enforcement of this regulation by the Coast Guard to prevent accidental discharge.

The proposed revisions to the regulations may increase compliance and enforceability and reduce unintentional violations relating to the use of marine sanitation devices in the sanctuaries. This may result in a decrease in the accidental or illegal discharge of raw sewage and hazardous wastes from vessels, which would benefit hazardous waste management and hazardous waste disposal in the sanctuaries.

Cruise Ship Discharge and Definitions

The proposed regulations on cruise ships would ban the discharge or deposit of any material or matter other than vessel engine cooling water, generator cooling water and anchor wash. Existing California law prevents discharges of graywater and raw sewage within 3 nm (3.5 miles; 5.5 km) of the shore; this regulation would extend this protection across all three sanctuaries and throughout the proposed Davidson Seamount area. The regulations would provide a beneficial impact on the management of hazardous waste and waste disposal throughout the ROI as they could prevent cruise ships from releasing oily water, graywater, hazardous materials and hydrocarbons into the sanctuary and increase pollution prevention efforts.

Alternative Regulatory Actions

Cruise Ship Prohibition Alternative

This alternative is intended to have the same impact as the Proposed Action; however it should be noted that some MSDs do not meet the effluent standards they are designed to meet (State of Alaska Department of Environmental Conservation 2000). It is possible that ongoing discharge of cruise ship treated wastewater into the sanctuaries could have minor impacts on hazardous waste management, despite being conducted under an approved discharge plan. As noted in Section 3.5.4 (Water Quality), some MSDs do not achieve the effluent standards they are intended to meet. Although beneficial compared to existing conditions, this alternative could result in a less beneficial impact on hazardous waste management and disposal than under the Proposed Action.

The No Action Alternative

The No Action alternative would be to continue to manage the sanctuaries as they are currently managed. This would result in no impact on hazardous waste and hazardous materials management.

3.8.5 Cordell Bank National Marine Sanctuary – Environmental Consequences

The Proposed Action

Seabed Protection

The proposed regulation would prohibit drilling, dredging, or altering, constructing, placing, or abandoning any structure material or matter on the submerged lands within the line representing the 50-fathom isobath surrounding Cordell Bank. Additionally, the regulation would prohibit the same activities listed above in the remainder of the sanctuary outside the 50-fathom isobath, with the exception of anchoring. This regulation would help reduce or eliminate the potential for disposal of wastes and hazardous materials that may be associated with the activities listed above and would have an overall beneficial impact on the management of hazardous waste and waste disposal in the sanctuary. The regulations would reduce pollution discharge associated with these activities and would protect benthic resources and their habitats.

Benthic Habitat Protection

This proposed clarification would have no impact on hazardous wastes and waste disposal.

Alternative Regulatory Actions

Seabed Protection

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within a line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action. This alternative would help reduce or eliminate activities that have the potential to dispose of wastes and hazardous materials in the Sanctuary. As such it would have the same beneficial impact on hazardous materials management as the Seabed Protection regulation in the Proposed Action.

All other aspects of this alternative would have the same beneficial impacts on the management of hazardous waste and waste disposal as described under the Proposed Action.

Benthic Habitat Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within the line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action. Under this alternative, in addition to the minor corrections and clarifications, NOAA would issue regulations under the authority of the NMSA prohibiting bottom-contact fishing gear within the 50-fathom isobath around the Bank. Similarly, to the Proposed Action, this regulation would have no impact on hazardous wastes and waste disposal.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on hazardous materials management.

3.8.6 Gulf of the Farallones National Marine Sanctuary – Environmental Consequences

The Proposed Action

Deserted Vessels

The proposed regulation would prohibit vessels from being deserted in the Sanctuary and would prohibit leaving harmful matter (hazardous materials or wastes) aboard a deserted vessel. These two regulations would help reduce the potential for release of hazardous materials into the marine environment from deserted leaking vessels and from vessel stranding incidents. When a vessel is deserted there is a high risk of discharge of harmful matter (e.g., fuel, motor oil) into the marine environment. Implementing this regulation would reduce the risk substantially and, therefore, provide beneficial effects on the management of hazardous waste.

Water Quality – Discharges From Outside the Sanctuary

The proposed regulation would prohibit discharging or depositing any material or other matter from beyond the boundary of the Sanctuary that subsequently enters the Sanctuary and injures a Sanctuary resource or quality. This regulation proposes the same exceptions as the cross-cutting "discharge within or into the Sanctuary" regulation and would similarly benefit hazardous waste management and hazardous waste disposal in the sanctuaries as those described in section 3.8.4 for the cross-cutting discharge regulation clarifications. In addition, the Proposed Action would help reduce or eliminate potentially hazardous pollutants such as oil, sewage and other harmful chemicals from entering the sanctuaries and potentially causing injury to Sanctuary resources or qualities. Potential upland sources of pollution include municipal wastewater outfalls, industrial outfalls, surface runoff (nonpoint source pollution), and oil and hazardous materials spills. Some examples of

marine based sources of pollution include discharges from transiting and wrecked ships, and underwater pipelines). This regulation would result in potential direct beneficial impacts on hazardous waste management and hazardous waste disposal in the sanctuaries, by minimizing or reducing the likelihood that these hazardous or toxic spills or discharges will enter the Sanctuary.

Oil and Gas Pipeline Clarification

The proposed regulation would limit pipelines going through the Sanctuary to those associated with facilities located adjacent to the Sanctuary rather than from any offshore oil and gas facility located outside the Sanctuary, as currently allowed by the existing regulation. There are no existing or planned oil and gas production facilities in the vicinity of the sanctuary so this proposed change in regulation is primarily technical in nature. To the minor extent that this change would reduce the potential for pipelines to be installed within the sanctuary, this would reduce the potential for impacts from pipeline construction, and reduce risk of oil or gas spills or other hazardous materials being deposited into Sanctuary waters. This would result in a minor beneficial impact on hazardous waste management in the Sanctuary.

Alternative Regulatory Actions

There are no alternatives that would impact hazardous waste management or disposal.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on hazardous waste and hazardous materials management.

3.8.7 Monterey Bay National Marine Sanctuary – Environmental Consequences

The Proposed Action

Deserted Vessels

The proposed MBNMS prohibitions regarding deserted vessels and leaving harmful matter aboard deserted vessels are the same as the proposed GFNMS regulations and beneficial impacts would be the same as described above in Section 3.8.6.

Davidson Seamount

Adding the Davidson Seamount to the Sanctuary would have a beneficial impact on the management of hazardous waste and waste disposal on and around the Davidson Seamount. By including the seamount, existing Sanctuary regulations regarding activities and discharges would apply, which would help to reduce hazardous discharges. Furthermore, the proposed new discharge regulations would apply to this area. The addition of the seamount to the Sanctuary would clarify regulations for managing hazardous waste issues surrounding the seamount and would make the regulations easier to enforce.

Motorized Personal Watercraft

The proposed definition of MPWC would reduce the MPWCs allowed for use within the Sanctuary. The action would result in a negligible reduction in the amount of pollution discharged from such vehicles. As discussed in the water quality analysis in Section 3.5, Water Quality, MPWCs can discharge fuel-related contaminants (oil and gasoline) into the marine environment. The reduction in potential hazardous materials discharge associated with the anticipated reduction in MPWC use would result in a very slight beneficial effect.

Dredge Disposal—SF-12

The proposed regulation modification would adjust the location of the SF-12 Dredge Disposal Site to the head of the Monterey Canyon. This would allow the dredge material to be disposed in deeper water rather than to shallow coastal waters where it could be transported by waves and currents to onshore beaches. No increase in the volume of dredge material is part of this action. As noted in Section 3.8.1, dredge material cannot be disposed if it contains contaminants. Therefore, the Proposed Action would have no effect on the management of hazardous materials and waste in the Sanctuary.

Dredge Disposal—Monterey and Santa Cruz

The proposed regulation modification would also identify, codify, and recognize the two dredge disposal sites at Twin Lakes State Beach (Santa Cruz Harbor) and Monterey Harbor. These sites have not been consistently identified by coordinate location or have been identified by different descriptions. The use of these two dredge disposal sites predates the designation of the Sanctuary, and the two sites have been recognized as sites approved for dredge disposal subject to the conditions set forth in permits approved by USACE and USEPA subject to MBNMS authorization.

Redefining and officially locating disposal sites at Santa Cruz Harbor and Monterey Harbor would not result in any changes in the amount or location of permitted dredge disposal. Therefore, the Proposed Action would have no impact on the management of hazardous materials and waste in the Sanctuary.

Alternative Regulatory Actions

The alternatives would have the same impacts on hazardous waste management as identified in the Proposed Action, with the following differences.

Davidson Seamount NMSA Alternative

This alternative Davidson Seamount regulation would allow existing Sanctuary regulations to be in effect which would help to reduce hazardous discharges. This alternative would have the same beneficial impact as described under the Proposed Action.

Davidson Seamount Circular Boundary Alternative

This alternative Davidson Seamount regulation proposes a circular boundary instead of a rectangular boundary and would have the same beneficial impact as described under the Proposed Action. Because the circular boundary would encompass a slightly larger area than the proposed boundary, slightly greater beneficial effects would be realized.

Motorized Personal Watercraft Alternative

This alternative would remove the four designated MPWC zones currently existing within the Sanctuary. In comparison to the Proposed Action, prohibiting MPWC from the entire Sanctuary would create a slightly greater, but still minor beneficial impact on hazardous waste and waste disposal management by eliminating the potential for hazardous waste discharged from MPWC to enter the Sanctuary and potentially injure Sanctuary resources.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on hazardous waste and hazardous materials management.

3.8.8 Cumulative Impacts

The ROI for cumulative hazardous waste and waste disposal would be the same as for the Proposed Action. There has been a steady increase in the total amount of hazardous waste shipped off-site from 1997 to 2002 in the state of California (California DTSC 2003). New laws and regulations are developed on an annual basis to manage the increasing hazardous waste generated in the state. Many of the cumulative projects identified in Section 3.1.4 would provide a beneficial impact on hazardous waste and waste disposal. County general plan updates would provide a beneficial impact by updating regulations and management of the resource. Updating NPDES permits regulates any hazardous waste that would leak into the watersheds and impact water quality. Restoration projects would clean up areas that may contain hazardous waste.

Implementation of the FMPs will contribute to the ROI's regional ecosystem health by applying the various action plans in CBNMS, GFNMS, and MBNMS. Implementation of ecosystem monitoring will provide the Sanctuaries with more complete information regarding waste and pollution within their boundaries. Action plans in GFNMS to address vessel spills will provide a better understanding of such risks within Sanctuary boundaries and techniques to protect the GFNMS ecosystem. The Farallon Islands Radioactive Waste Dump action plan would provide similar benefits to GFNMS. Within MBNMS, action plans that address harbor and dredge disposal, microbial contamination and beach closures, cruise ship discharges, and water quality will help MBNMS better understand the potential for hazardous waste contamination and waste disposal within Sanctuary boundaries.

The Proposed Action

While hazardous waste is generated in increasing amounts in the ROI, in recent years, more stringent legal requirements and more efficient hazardous waste management systems help prevent damage or risk to human health or the environment. Implementation of the FMPs and the new limitations on discharge in the sanctuaries, as well as the restrictions on activities that generate hazardous waste, would contribute to a beneficial cumulative impact on hazardous waste management and waste disposal in the ROI.

Alternative Regulatory Actions

Cumulative impacts would be the same as those described under the Proposed Action, with an increase in the level of beneficial impacts due to the increased levels of protection afforded by the MPWC alternative regulation, and the Davidson Seamount Circular Boundary Alternative, as described above.

The No Action Alternative

The No Action alternative would maintain the status quo of sanctuary management. No additional protections from proposed regulations would occur. There would be cumulative beneficial impacts on hazardous materials management from existing regulation and future management efforts, including implementation of the FMPs. The No Action alternative would not contribute to any cumulative impacts on hazardous materials management.

3.9 LAND USE AND DEVELOPMENT

This section describes the current land use along the coast of California within the ROI. The ROI for land use and development encompasses the boundaries of the marine sanctuaries and the Davidson Seamount area, and it also includes land use and development activities adjacent to the boundaries that may affect the individual sanctuaries or management of the sanctuaries. This section identifies and describes potential impacts on land use that would be caused by the Proposed Action, Project Alternatives, and the No Action alternative. This section also covers those uses of coastal waters that abut coastal lands that are within municipal jurisdictions, as well as military uses in the water and airspace of the ROI.

3.9.1 Regional Overview of Affected Environment

This section focuses on coastal development and marine uses not addressed in other specific resource sections. In addition to the uses described in this affected environment, the ROI is utilized for many research and educational uses (described in Section 3.12), recreation (addressed in Section 3.11), and commercial fishing (addressed in Section 3.6).

Regional Land Use

The ROI for land use includes the coastal areas of Sonoma, Marin, San Francisco, San Mateo, Santa Cruz, Monterey and San Luis Obispo counties that are adjacent to or that could be affected by actions in CBNMS, MBNMS, and GFNMS. CBNMS is entirely offshore and therefore does not include a coastal component. Land use immediately adjacent to the project area is mainly open space (including national, state, and local parklands), commercial use, and single-family and multi-family residential. Land use is urbanized in these coastal areas in the cities of San Francisco, Pacifica, Half Moon Bay, Santa Cruz, the Monterey Peninsula, and Morro Bay. In these cities, development is denser than the rest of the coastal areas bordering or near the three sanctuaries.

There are also some limited industrial uses in the project area, mainly commercial and recreational fishing harbors at San Francisco Bay, Bodega Bay, Bolinas, Half Moon Bay, Santa Cruz, Moss Landing, Monterey, and Morro Bay harbors. There are electricity generating plants at Moss Landing and Morro Bay and sewage treatment facilities in coastal areas in San Francisco, Half Moon Bay, Santa Cruz, and Monterey. San Francisco/Oakland/Richmond, Santa Cruz, Moss Landing, and Monterey harbors have ocean dredge disposal sites, all of which were in historic use prior to MBNMS designation. Every county contains coastal developments or beaches that serve as water-oriented recreational uses (see Section 3.11, Public Access and Recreation).

Much of the coastal area is set aside for open space. Adjacent to GFNMS, most of Sonoma and Marin's coastline is reserved for open space, including Salt Point State Park, Sonoma Coast State Beach, Tomales Bay State Park, Pt. Reyes National Seashore (PRNS), Stinson Beach Park (administered by the National Park Service), and the Golden Gate National Recreational Area (GGNRA). The exceptions are small residential coastal communities in Jenner, Bodega Bay, Tomales, Bolinas, Stinson Beach and Muir Beach.

San Francisco coastal areas immediately adjacent to GFNMS waters are federal or state open space, mainly consisting of GGNRA. Along the MBNMS coastline, there are very densely populated single-family and multi-family residential communities within a hundred yards of the shore from Geary Avenue south to Daly City. San Mateo County coastal areas are mainly open space. These open space areas include agricultural areas

used mainly used for grazing, interspersed with the following state beaches: San Gregorio, Pompanio, Pescadero, and Año Nuevo. There are small urbanized areas at Pacifica and Half Moon Bay.

Santa Cruz County's land use is similar to San Mateo's, with open space and agriculture dominating most of the county's coastal areas. The cities of Santa Cruz and Capitola, however, have a fairly dense population within 50 to 200 yards (46 to 183 meters) from the shore, including small lot single-family and multi-family residences on coastal bluffs immediately above the shore. There are seven state parks and beaches in Santa Cruz County that border MBNMS, including Año Nuevo State Reserve.

Monterey County contains the longest and most diverse urban land use adjacent to the sanctuaries. The Monterey Peninsula includes the cities of Marina, Sand City, Pacific Grove, Monterey, Pebble Beach, and Carmel. Land uses in the Monterey Peninsula are mainly single-family residential, with some commercial areas in the city of Monterey and private recreational areas in various places on the Monterey Peninsula. Much of the southern Monterey County coast is open space including 27 miles (43 km) of coastline of the Los Padres National Forest with day use beaches and coastal recreational opportunities. There are 12 California state parks or beaches in Monterey County that border MBNMS, including Andrew Molera State Park, Point Lobos State Reserve and Asilomar State Beach. Elkhorn Slough National Estuarine Reserve is located near Moss Landing. There are five Monterey County parks that border MBNMS, including South Monterey Dunes Park.

San Luis Obispo County coastal areas are mainly open space. These open space areas include agricultural areas, mainly used for grazing, which are interspersed with county beaches. At the southern end of MBNMS is the city of Cambria, which is mainly a retirement community and center for tourism. There are two California state parks or beaches in San Luis Obispo County that border MBNMS.

Water and Airspace Use

The main activities in sanctuary waters are commercial and recreational fishing, commercial shipping, and recreational activities, such as boating and whale watching. These activities are described in depth in sections 3.6, 3.10, and 3.11, respectively. Other uses in sanctuary waters include patrols by the US Coast Guard (USCG) and other Department of Homeland Security agencies, patrols by the California Department of Fish and Game, and passage of US Navy vessels and aircraft. Surface ships from the above entities and US Navy submarines routinely transit through the sanctuaries. During Navy transits, they engage in training onboard and operate in accordance with all CWA requirements and associated federal regulations. The Navy indicates that protective measures are used by training exercise planners to increase situational awareness of unit commanders to ensure that training activities do not result in takes under the MMPA and ESA. The USCG is the most active government agency regarding use of sanctuary waters. USCG activities include nearshore search and rescue operations, environmental enforcement, drug interdiction, and "Deepwater" program activities, which are located more than 50 miles (80 km) offshore. Also, the USCG flies maintenance personnel by helicopter to the lighthouse on Southeast Farallon Island for periodic servicing.

Airspace above the sanctuaries is transited by commercial jets using San Francisco, Oakland, and San Jose airports and private aircraft based at or using the numerous small airports throughout Northern and Northern/Central California (i.e., Monterey or Half Moon Bay). Sanctuary airspace is also used by the US Navy for training. The US Navy's Third Fleet conducts surface, air, and submarine maneuvers. The Federal Aviation Administration (FAA) has approved Special Use Airspace designations for Navy and Marine Corps

flights over sanctuary waters. The Navy maintains the following two warning areas in and around the current boundaries of the Gulf of Farallones National Marine Sanctuary.

- Warning Area 260 (W-260): W-260 is special-use airspace over open-ocean located off the California coast north of the San Francisco Bay area beginning approximately 70 nm (81 miles; 136 km) northwest of the previous Naval Air Station Moffett Field. The airspace extends from the surface up to 60,000 feet (18,288 meters). W-260 is used for all-weather flight training, air intercepts, surface operations, air-to-surface bombing, and rocket and aerial gunnery exercises with conventional ordnance. No ordnance expenditures are authorized within eight nm of Cordell Bank (38°01'N, 123°25'W).
- Warning Area 513 (W-513): W-513 is special-use airspace over open-ocean located off the California coast located west of the San Francisco Bay area. It is bounded to the north by W-260 and begins approximately 55 nm (61 miles; 102 km) northwest of the former Naval Air Station Moffett Field. The warning area extends from the ocean bottom up to 60,000 feet (18,288 meters). W-513 is used for flight training, air intercepts, and surface operations with inert conventional ordnance. No ordnance or pyrotechnics are authorized within 3 nm (3.5 miles; 5.5 km) of Noonday Rock (37°49'N, 123°13'W).

Military use of MBNMS includes air, surface and underwater activity. Some activity includes the use of non-explosive ordinance, sonar, smoke markers and the temporary placement of objects for torpedo firing or sonar location training. Air activities include aircraft carrier takeoffs and landings, and low-level air combat maneuvering. The U.S. Navy uses these areas for submarine operations and minesweeping training exercises. On occasion, U.S. Marines practice amphibious landings on the beaches adjacent to this area. The military also conducts non-combat-related preparedness activities such as underwater cable repair and breakwater maintenance. There are six designated military zones within or adjacent to MBNMS, including three submerged submarine operating areas, a warning area (#285), a naval operating area, and the Hunter Military operations area (onshore). More details on these military uses are provided at the MBNMS website: http://montereybay.noaa.gov/research/ techreports/marinezones/mil.html. Military activities that were specifically identified in the MBNMS designation document are exempt from Sanctuary regulations. For new activities, or activities which were not identified in the designation document, MBNMS requests modification or prohibition of the activities to minimize impacts on Sanctuary resources.

Coastal and Offshore Energy Development

Oil and gas exploration and development is prohibited in the three sanctuaries and no oil and gas development occurs in the surrounding waters or in the Davidson Seamount area. There are no discovered oil and gas resources in the sanctuaries, though the United States Department of Interior (USDOI) has estimated that there are substantial undiscovered conventionally recoverable oil and gas resources (USDOI 1999).

3.9.2 Regulatory Environment

California Coastal Act of 1976, Cal. Pub. Res. Code § 30000 et seq.

The California Coastal Act of 1976 establishes policies guiding development and conservation along the California coast. The Coastal Act requires that local governments lying wholly or in part within the coastal zone prepare a Local Coastal Program (LCP) for its portion of the coastal zone. LCPs implement the California Coastal Act by establishing plans that are consistent with the Coastal Act. A Local Coastal Program is defined by Coastal Act Section 30108.6 as "a local government's (a) Land Use Plans, (b) zoning ordinance,

(c) zoning district maps, and (d) within sensitive coastal resources areas, other implementing actions, which, when taken together, meet the requirements of, and implement the provisions and policies of, this division at the local level."

City and County Plans

All city and county local coastal plans and land use plans in the project area have been certified by the California Coastal Commission except for small areas in Pacifica in San Mateo County; small areas of the city of Santa Cruz; Pacific Grove, Sand City, and Malpaso and Yankee beaches in Monterey County; and Sweet Springs Marsh in San Luis Obispo County (California Coastal Commission 2004a). The Coastal Commission has retained original jurisdiction over these latter areas.

The Sonoma County General Plan and the Sonoma County Local Coastal Program govern land use along the coastal areas in Sonoma County that are adjacent to GFNMS. The LCP includes a coastal plan last updated in 2000, maps, and zoning ordinances to implement the plan (Sonoma County 1989; Posternak 2004).

The Marin Local Coastal Program Land Use Plan and the West Marin Planning Area portion of the Marin Countywide Plan are the planning documents that govern development along the coastline in Marin County (Marin County 1982 and Marin County 2004).

The Western Shoreline Area Plan of the San Francisco General Plan governs land use development along the shoreline in the county of San Francisco (City and County of San Francisco 2004).

The San Mateo County Local Coastal Program was approved in 1982 and most recently amended in June of 1998. The LCP includes local coastal program components similar to a general plan, figures, standards, and management guidelines for managing the coastal resources in the county's portion of the coastal zone pursuant to the requirements of the California Coastal Act (San Mateo County 1998).

The Santa Cruz County General Plan is the comprehensive planning document governing development within the city and contains goals, policies, and programs describing the community's vision for economic viability, livable neighborhoods, and environmental protection. The county's coastal zone is regulated according to coastal-dependent uses in which priority is given to agricultural, recreational, and residential uses, respectively. Coastal communities in Santa Cruz County have incorporated elements of the county LCP into their specific plans (Santa Cruz County 1994).

The city of Santa Cruz has prepared its LCP as part of its general plan. The city's LCP contains a land use plan, implementing ordinances, and maps designed to preserve the unique coastal resources within the city's portion of the coastal zone pursuant to the requirements of the California Coastal Act. On March 9, 1995, the California Coastal Commission certified relevant portions of the city's general plan as the LCP (City of Santa Cruz 2004).

The City of Monterey Local Coastal Program establishes land use guidelines for the area of Monterey that lies within the coastal zone (City of Monterey 1981). The coastal zone in Monterey is regulated under the City of Monterey General Plan and specific LCPs, including the Skyline Land Use Plan and the Del Monte Beach Plan (City of Monterey 1981).

The Monterey County Local Coastal Program covers the non-urban areas of Monterey County. The Big Sur Coast Land Use Plan serves as the planning document for the area from Carmel to the San Luis Obispo County border (Monterey County 1981).

The north area of San Luis Obispo is covered by the North County Coastal Plan (San Luis Obispo County 1982); this plan was amended in 1992.

Other regulatory requirements and permit processes that affect land use in the sanctuary areas include regulation of wetlands under Section 404 of the CWA by the USACE (see Section 3.3.4 for more detail), management plans and permit systems by GGNRA, Point Reyes National Seashore, the Los Padres National Forest Management Plan, and various State Parks (mentioned above) that border sanctuary waters.

3.9.3 Significance Criteria and Impact Methodology

Criteria to determine the significance of impacts from land use and development are based on federal, state, and local standards and regulations. Impacts are considered to be significant if the Proposed Action creates the following:

- A conflict or inconsistency with established land or water use plans (e.g., county plans);
- A substantial change in existing land or water uses;
- An interference with the public's right of access to the sea; or
- Otherwise violates the NMS or NOAA Program Regulations.

Impacts on land use and development were assessed based on whether the Proposed Action is consistent with state and local plans and whether the Proposed Action would cause adverse land use changes or land use conflicts. The overall methodology is consistent with CEQ guidance and NOAA NEPA guidelines (NAO 216-6).

3.9.4 Cross-Cutting Regulations – Environmental Consequences

While cross-cutting regulations are similar for all three sanctuaries, their impact could be different in different areas. Therefore, land use impacts from cross-cutting regulations in all three sanctuaries are described below based on their impact on those municipal jurisdictions (mainly by county) that are adjacent to the sanctuaries and the ports used by vessels that visit the sanctuaries (see Section 3.6, Commercial and Recreational Fisheries, for more detail). These jurisdictions are grouped into three sets, including the northernmost counties (Sonoma and Marin); central counties (San Francisco and San Mateo); and southernmost counties (Santa Cruz, Monterey, and San Luis Obispo).

The Proposed Action

Introduced Species

Implementing stricter regulations to reduce the number of introduced species in the sanctuaries would have a beneficial impact on land use, especially in the San Francisco Bay and Monterey Bay coastal areas.

Invasive fouling organisms such as mollusks and sea squirts can attach themselves to any solid substrate within the San Francisco Bay and Monterey Bay coastal areas. Such attachment of introduced fouling organisms causes increased repair and maintenance costs for any operations that involve the use of submarine

structures. This negative economic impact affects wastewater treatment facilities, ship operators, harbor-based fishery operations, aquaculture operations, public aquariums, biological control operators, erosion control structure operators, and live bait operations. By reducing the number of invasive species in the area, this measure may decrease the interference of invasive fouling organisms with intake and discharge pipes and other marine equipment and allow current land users to reduce repair costs. Reducing the costs of existing land users would promote the economic viability for the continuation of existing land uses.

No land uses have been identified that are dependent upon the introduction of nonnative species into the sanctuaries, other than perhaps the possibility of culturing nonnative species, such as oysters, clams, abalone, and fish. Regulations already exist that prohibit hull scrapings (toxic antifouling agents and associated fouling organisms) from entering waterways and that limit the extent and type of mariculture operations. Laws addressing this include the California Marine Invasive Species Act of 2003 (this act mandates the management of ballast water and reauthorized and improved upon the California Ballast Water Management and Control Act (AB 703) and the National Invasive Species Act of 1996 (this act controls the spread of Aquatic Nuisance Species). In addition, the California State Aquatic Invasive Species (AIS) Management Plan is currently being drafted to address invasive species problems.

The proposed prohibition includes an exception for species cultivated by existing mariculture activities in Tomales Bay pursuant to a valid lease, permit, license or other authorization issued by the State of California and in effect on the effective date of the final regulation, so no adverse impacts on this land use would occur. Live bait operations will be prohibited from depositing any left-over nonnative live bait species into MBNMS waters. Other users of harbors within MBNMS include restaurants, retail seafood operations and public aquariums. While most businesses do not, as a standard practice, intentionally introduce nonnative species into ocean waters, such introduction might happen accidentally through improper disposal of unused stock or packing materials such as seaweed or seawater. The introduced species prohibition would not impose a significant burden on business operations, however, and compliance would likely be assisted by the public education and outreach elements of the FMPs.

The Proposed Action would have no significant adverse impact on land use in the ROI, and would have a beneficial impact on existing land uses.

Discharge Regulation Clarifications, Marine Sanitation Devices and Graywater

There would be both beneficial and less than significant adverse impacts on land use and development from the proposed discharge regulations.

The proposed regulations require vessel operators to lock all MSDs in a manner that prevents discharge of untreated sewage. The proposed regulations also require vessels of 300 gross tons or larger to hold sewage onboard, within sanctuary boundaries, if they have sufficient holding capacity. This regulation may decrease levels of contaminants in all coastal waters, which would be consistent with the current use of those waters for recreation activities that depend upon clean water, such as swimming, surfing, and fishing. This regulation would have a beneficial impact on land use by furthering the recreation goals of the relevant land use plans. Very few large-vessels dock in sanctuary waters so there would be no increased demand for shore side waste processing facilities. The proposed regulations are therefore not expected to cause any changes in land use and would not cause any adverse impacts.

The proposed discharge regulations would require that commercial and recreational boat operators dispose of harmful (as defined in the proposed regulations) deck washdown, oily bilge and ballast water, and waste from on board meals outside of the sanctuary. Planned sanctuary education and outreach programs would help with reducing the source of harmful materials. Some of this effluent, however, would have to be discharged at harbor facilities which would place additional burdens on them to accommodate the larger amount of waste disposed dockside. This additional burden on harbor facilities would be a less than significant impact. In the northern area of the ROI, facilities for processing such waste exist at harbors in Bodega Bay and San Francisco County. Due to the small scale of harbor facilities servicing commercial vessels visiting CBNMS and GFNMS from Sonoma and Marin county ports, potential offloaded waste would not be of a large enough quantity to necessitate expansion of harbor facilities. It should be noted that GFNMS is investigating locating a sewage pumpout station in Tomales Bay.

Adverse impacts in San Francisco and San Mateo counties due to potential additional burdens on harbor facilities would be less than significant. The potential offloaded waste for vessels that frequent the three sanctuaries would not be a large enough quantity to necessitate expansion of harbor facilities beyond the current areas that are designated for industrial or harbor uses. While there may be redesign of harbor areas to accommodate any new facilities, this would not change the nature of the land use nor would it conflict with current land use designations. Therefore, there would be less than significant impacts on land use.

Adverse impacts on harbor facilities in Santa Cruz, Monterey, and San Luis Obispo counties due to potential increased waste-handling demand would be similar to impacts in other counties and would be less than significant. The potential offloaded waste from vessels that frequent MBNMS would not be a large enough quantity to necessitate expansion of harbor facilities. In 1999, bilge and crankcase oil pump-outs were installed at Monterey and Moss Landing harbors. A similar system was installed in Santa Cruz harbor in 2002. These systems, with a significant amount of education and promotion, have been very successful, leading to the recycling of over 8,000 gallons (30,283 liters) of oil in Monterey and Moss Landing harbors. The systems however, have proved to be expensive to operate and maintain for the harbors. The existing pump-out station at Pillar Point harbor is now of insufficient capacity and needs to be replaced (NOAA 2003f). However, this existing condition needs to be remedied regardless of the proposed action and the potential slight increase in demand for waste handling facilities would not result in a significant impact.

Cruise Ship Discharge and Definitions

Proposed regulations regarding discharges in the sanctuaries state that cruise ships may not discharge into sanctuary waters other than clean engine cooling water, generator cooling water and anchor wash. This regulation may decrease levels of contaminants in Sonoma and Marin county waters, which would be consistent with the use of those waters for recreation. This regulation would have a beneficial impact on land use by furthering the recreation goals of the relevant land use plans. Cruise ships do not dock in Sonoma or Marin counties; therefore, there would be no increased demand for shoreside waste processing facilities.

This regulation may decrease levels of contaminants in San Francisco and San Mateo county waters, which would be consistent with use of those waters for recreation. This regulation would have a beneficial impact on land use by furthering the recreation goals of the relevant land use plans. Cruise ships do not dock in San Mateo County; therefore, there would be no increased demand for shoreside waste processing facilities. Cruise ships do dock in San Francisco, and it is possible that there would be an increase in demand for shoreside waste treatment processing facilities. The proposed new cruise ship terminal in San Francisco is currently evaluating the need to install pumpout facilities. However, this scenario is unlikely because cruise

ships are more likely for economic reasons to discharge their waste in the ocean outside of the sanctuaries and outside of state waters.

This regulation may decrease levels of contaminants in Santa Cruz, Monterey and San Luis Obispo County waters, which would be consistent with use of those waters for recreation. This regulation would have a beneficial impact on land use by furthering the recreation goals of the relevant land use plans. Cruise ships currently only anchor offshore Monterey, but cannot dock at the port since the harbor is too shallow and small; therefore, there would be no increased demand for shoreside waste processing facilities.

The Proposed Action is not expected to cause any changes in land use in the ROI. Therefore, it would not cause any adverse impacts.

Alternative Regulatory Actions

Cruise Ship Prohibition Alternative

This alternative would result in the same impacts on land use as the Proposed Action.

The No Action Alternative

The No Action alternative would be to continue to manage the sanctuary as it is currently managed. This would result in no impact on land use.

3.9.5 Cordell Bank National Marine Sanctuary –Environmental Consequences

The Proposed Action

Seabed Protection

The proposed prohibition against disturbing the seabed would have no impact on land use. As noted in Section 3.6, Commercial Fisheries, the Proposed Action would not have a significant adverse effect on commercial fishing and thus the Proposed Action would not affect fishing-related land uses or businesses. The proposed action includes an exception that would allow anchoring in areas outside the 50 fathom isobath of the Bank. The ability to anchor in these areas would mean that no changes in boat type or docking facilities would be necessary and there would be no impact on coastal land use in the ROI. There are no other current or planned land use activities that would be impacted by this regulation and there would be no adverse impact on land use as a result of the Proposed Action.

Benthic Habitat Protection

The proposed clarification would result in no adverse impact on land use.

Alternative Regulatory Actions

The alternatives would have the same impacts as identified in the Proposed Action, with the following differences.

Seabed Protection Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within the line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action. The ultimate effect of this alternative would be the same as under the Proposed

Action. As there would be no impact on land use under the Proposed Action, there would be no impact on land use under this alternative either.

Benthic Habitat Protection

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within the line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action and would have no impact on land use, the same as the Benthic Habitat Protection regulation in the Proposed Action.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed; however NOAA Fisheries would issue regulations that would continue to limit fishing activities around Cordell Bank. This would result in no impact on land use.

3.9.6 Gulf of the Farallones National Marine Sanctuary –Environmental Consequences

The Proposed Action

Water Quality – Discharges From Outside the Sanctuary

The proposed regulation would prohibit discharging or depositing any material or other matter from beyond the boundary of the Sanctuary that subsequently enters the Sanctuary and injures a Sanctuary resource or quality. This regulation proposes the same exceptions as the cross-cutting "discharge within or into the Sanctuary" regulation and would have similar beneficial and less than significant adverse impacts to land use and development as those described in section 3.9.4 for the cross-cutting discharge regulation clarifications. In addition, the Proposed Action would help reduce or eliminate potentially harmful pollutants such as oil, sewage and other hazardous chemicals from entering the sanctuaries and causing injury to Sanctuary resources or qualities. Potential upland sources of pollution include municipal wastewater outfalls, industrial outfalls, surface runoff (nonpoint source pollution), and oil and hazardous materials spills. Some examples of marine based sources of pollution include discharges from transiting and wrecked ships, and underwater pipelines).

Although many land uses, such as livestock grazing, agriculture, and urban and surburban runoff may discharge pollutants outside the Sanctuary that subsequently enters the Sanctuary, the threat of any one discharge injuring a Sanctuary resource is very small to negligible. The combination of the distance from the pollution source and the strong mixing action of the Pacific Ocean (or strong tidal flushing and mixing in the Estuaries and Bays) tends to rapidly dilute the pollutants from individual sources to a level that is not likely to cause injury to a Sanctuary resource. Likewise, most municipal wastewater treatment facilities, if functioning properly, are capable of discharging secondary or tertiary treated wastewater to levels that meet EPA and State Regional Water Quality Board standards. Treated sewage that is discharged by municipalities in high-energy offshore ocean sites would rapidly mix and dilute to levels that are not likely to cause injury to Sanctuary resources. The proposed regulation, therefore, is targeted at those high volume or harmful discharges, such as such oil, untreated sewage, and hazardous spills or deliberate releases that are capable of entering Sanctuary and injuring a Sanctuary resource. The NMSP is not aware of any uses that, through their normal activity, would be impacted by this regulation. Therefore, the proposed regulation would have less than significant adverse impacts on land use and development. Since this proposed regulation could help

reduce potentially harmful impacts from entering the Sanctuary, it could provide beneficial impacts to some land uses that rely upon a healthy water quality, such as recreation, tourism, and mariculture.

Alternative Regulatory Actions

There are no regulatory alternatives for GFNMS that would have any discernable impacts on land uses in the ROI.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on land use.

3.9.7 Monterey Bay National Marine Sanctuary–Environmental Consequences

The Proposed Action

Boundary Changes - Davidson Seamount

Inclusion of Davidson Seamount in MBNMS would result no adverse land use impacts. No current or planned land use activities would be affected by incorporating the Seamount into the Sanctuary.

Motorized Personal Watercraft

The change in definition for MPWC would have the potential to reduce the number of MPWC in the Sanctuary. This reduction may lessen the demand for launching facilities at local ports (and reduce revenues for the harbors), but this type of socioeconomic impact is addressed in Section 3.13. No adverse impacts on land uses would occur. Impacts on recreational uses associated with this proposed regulation are described in Section 3.11.

Alternative Regulatory Actions

The alternatives would have the same impacts as identified in the Proposed Action, with the following differences.

Motorized Personal Watercraft Alternative

This alternative would prohibit all MPWC in MBNMS. By eliminating MPWC, commercial MPWC operations in MBNMS would cease and demand for MPWC launching facilities at local ports would be eliminated. MPWC operations do not make up a significant percentage of local marine business or commercial harbor facilities in the area. Therefore, no impact on land use and development would occur as a result of this alternative.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on land use.

3.9.8 Cumulative Impacts

The ROI for cumulative impacts includes the coastal, nearshore, and offshore areas of the three sanctuaries and surrounding coastal lands and waters, including the Davidson Seamount area. This section addresses the cumulative effects on land use that would be caused by the combination of impacts from the Proposed

Action and from other sources of potential land use impacts, such as coastal development and coastal land use regulations.

Trends for land use resources in the coastal areas adjacent or near sanctuary waters are: higher density in urban areas near coastal areas, such as San Francisco, Half Moon Bay, Monterey, Santa Cruz and Cambria and increased use of land for open space and recreation. Federal, state and local government agencies, such as the National Park Service and California State Parks and non-profit organizations, such as the Nature Conservancy have been purchasing land in coastal areas to preserve agriculture and open space. Due to these purchases and due to other socioeconomic factors, some small coastal communities have seen a reduction in commercial and residential land uses.

Implementation of the FMPs will contribute to the ROI's regional ecosystem health by applying the various protective action plans in CBNMS, GFNMS, and MBNMS.

The Proposed Action

The proposed regulations would not result in any substantial change in existing land uses, would not cause a conflict or inconsistency with established land or water use plans, would not interfere with the public's right of access to the sea, and would not otherwise violate the NMS or NOAA Program Regulations. Therefore, the proposed regulations would not contribute to any cumulative impacts related to land use within the ROI.

Alternative Regulatory Actions

As with the Proposed Action, the alternative regulations would not contribute to any cumulative impacts related to land use within the ROI.

The No Action Alternative

The No Action alternative would maintain the status quo of sanctuary management. Under the No Action alternative, existing trends in land use would continue, and the No Action alternative would not contribute to any cumulative impacts on land use, either beneficial or adverse.

3.10 MARINE TRANSPORTATION

This section addresses the impact of proposed regulatory changes on marine transportation. A summary of existing marine transportation activities in the region is provided. The impact analysis presents the standards used to evaluate impacts on marine transportation and addresses potential effects of the proposed action on this resource area. Impacts on recreational boating and fishing are addressed in Section 3.11 and impacts on commercial fishing are assessed in Section 3.6.

The ROI for the marine transportation analysis includes the coastal area from the southern edge of MBNMS north to Bodega Bay on the edge of GFNMS, west to include all the waters within the three sanctuaries as well as the proposed area surrounding Davidson Seamount, and east to include the Golden Gate. In addition, the proposed regulatory changes would affect discharges occurring outside of the NMS boundaries that flow back into the NMS.

3.10.1 Regional Overview of Affected Environment

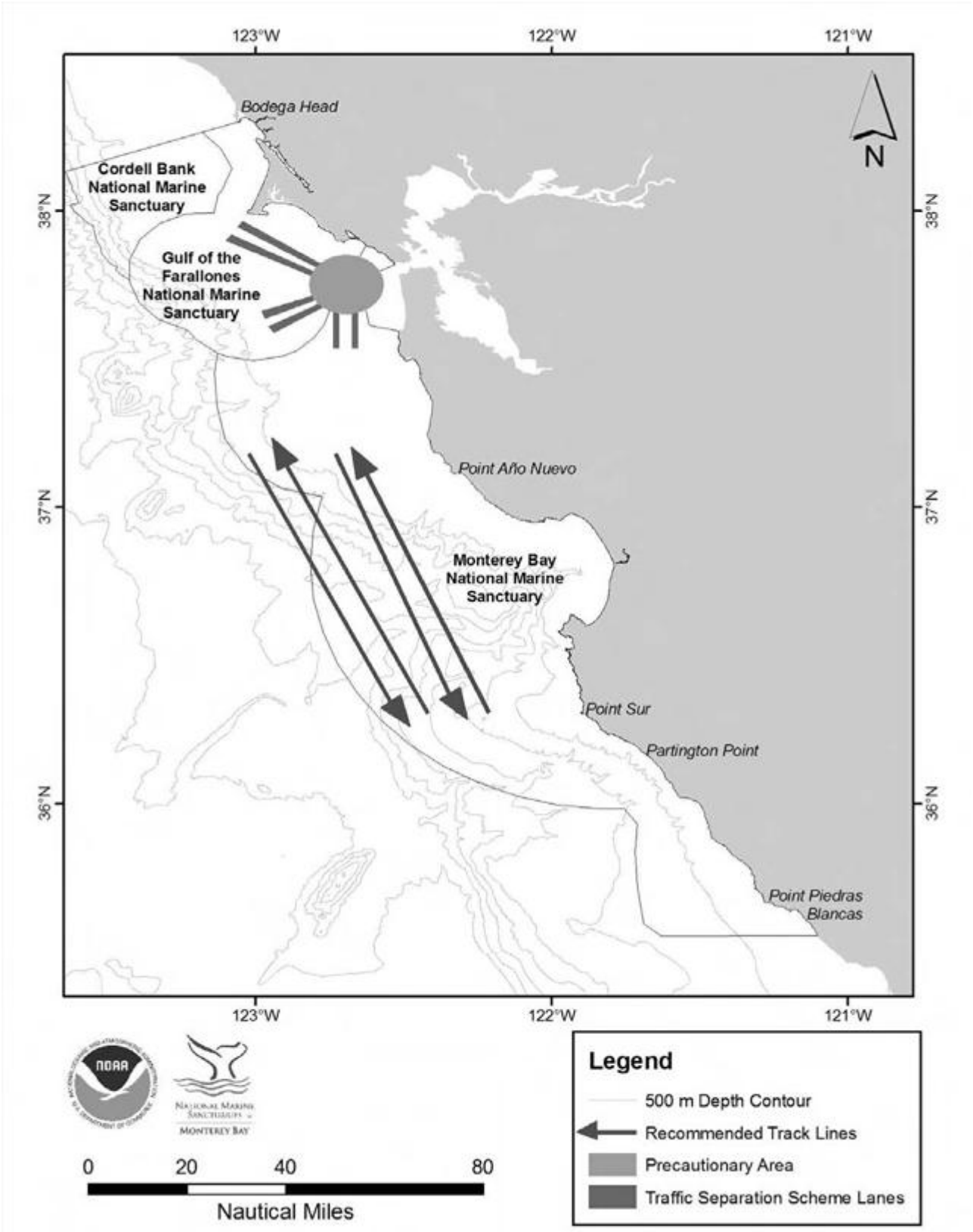
Vessel Activity

According to Lloyds Maritime Information Services, in 2000, 3,575 cargo vessels called at ports on San Francisco Bay, including 1,936 container vessels, 787 tankers, 626 dry bulk vessels, and 226 other types (Bureau of Transportation Statistics 2002). Approximately half of these vessels transit south off the coast of California, while the other half transit north or west of San Francisco. Data from the USACE show a similar level of movement, with approximately 3,600 vessels (including foreign and domestic vessels, tugs, and barges) entering San Francisco Bay from the Pacific Ocean each year (USACE 2002a). In addition, approximately 3,000 large vessels transit along the northern/central California coast every year (Pacific States/British Columbia Oil Spill Task Force 2002), passing through the three sanctuary ROI. Shipping lanes are shown in Figure 3-11.

Historically, the total number of hazardous spills from transiting vessels is small, but the potential impacts may be enormous given the number and volume of vessels and the hazardous cargo lane's proximity to major seabird and marine mammal populations at the GFNMS Islands and elsewhere in Sanctuary waters. During the last year (2005), approximately 2,000 commercial vessels were reported using the southern approach shipping lane. Large commercial vessels are of particular concern for spills since they can carry up to 1 million gallons of bunker fuel, a heavy viscous fuel similar to crude oil, which they use for fuel. Also, there is a great deal of movement of oil from oil tankers carrying oil annually up and down the coast of California.

The overwhelming majority of foreign vessel traffic in this region consists of ships and barges destined for San Francisco Bay. The harbors at Monterey, Morro Bay, and Santa Cruz saw occasional foreign vessel calls between 1998 and 2002, while foreign traffic at Humboldt Bay peaked in 2000, then fell sharply (Algert 2004; Yerena 2004; Casey 2004; Kinnamon 2004).

A relatively small amount of the traffic in the ROI is cruise ships. In 2004, 37 cruise ships repositioned from Mexico and the Caribbean to Seattle and Vancouver, British Columbia for cruises through the Inside Passage to Alaska. These ports jointly experienced growth in cruise passengers from 605,000 in 1994 to 1.3 million in 2003, an average annual growth rate of 8.9 percent (Port of Seattle 2004; Port of Vancouver 2004).



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Shipping Lanes

Northern/Central California

The Port of San Francisco experienced steady gains in cruise ship traffic, from 44 calls and 56,968 passengers in 1994 to 80 calls and 137,315 passengers in 2003 (Port of San Francisco 2004). San Francisco is a port of call for approximately 10 percent of its cruise calls and a port of embarkation or homeport for 90 percent of its calls. Some of the cruises originating in San Francisco travel down the coast of California to Mexican ports of call. One of the ports of call along the way is Monterey. There were three visits by cruise ships to Monterey in 2002, 14 visits in 2003, 18 visits in 2004, and 9 visits in 2005. There are 2 visits planned for 2006 (City of Monterey 2006).

Fifteen of the eighteen vessels that visited Monterey in 2004 carried an average of 1,921 passengers and were 870 feet (265 meters) in length. The remaining three vessels carried an average passenger load of 357 and were 569 feet (173 meters) in length. In San Francisco, 70 out of 85 vessel calls were ships that carried 1,745 passengers and averaged 861 feet (262 meters) in length. The remaining 15 vessels carried 232 passengers and averaged 387 feet (118 meters) in length.

The US Navy routinely operates surface ships and submarines through GFNMS as part of training activities. During these transits, they comply with the requirements of the Federal Water Pollution Control Act section 312 and associated federal regulations. However, this does not apply to activities that may be required of the US Navy during times of national crisis. Activities of other services or federal agencies, including the USCG or Homeland Security Department, are not included in this description.

3.10.2 Regulatory Overview

Federal Regulations

Several acts of Congress govern the movements of commercial vessels in specified waterways. These acts include the Ports and Waterways Safety Act of 1972, the Port and Tanker Safety Act of 1978, and the Oil Pollution Act of 1990. In addition, the Coast Guard Vessel Traffic Service (VTS) regulations became effective October 1994. The VTS San Francisco Area includes the Pacific Ocean in a 38.7 nm (33 miles; 77 km) radius around Mount Tamalpais, which is 10 miles (16 km) north of the Golden Gate. State law also governs the discharging of ballast water through the California Marine Invasive Species Act (AB 433, 2003), the California Coastal Ecosystems Protection Act (SB 497, 2006) and the Ballast Water Regulations for Vessels Arriving at California Ports or Places after Departing from Ports or Places within the Pacific Coast Region (2 CCR Sections 2280 through 2284, 2005)..

The Ports and Waterways Safety Act of 1972 authorizes the US Coast Guard to establish vessel traffic service/separation (VTSS) schemes for ports, harbors, and other waters subject to congested vessel traffic. The VTSS apply to commercial ships, other than fishing vessels, weighing 300 gross tons (270 gross metric tons) or more (NOAA 2005b).

The volunteer traffic separation lanes used by commercial vessels transiting the northern/central California coast were established in 2000 by the United Nations International Maritime Organization (IMO) and were the result of a collaborative effort between the USCG and MBNMS. The intention of this effort was to reduce the likelihood of a spill in MBNMS along the central and northern California Coast as well as to ensure safe, efficient, and environmentally sound transportation by vessels.

The new plan routes large vessels in north-south tracks ranging from 13 to 20 nm (15 to 23 miles; 24 to 37 km) from shore between Big Sur and the San Mateo coastline. Most cruise ships sail along the

northern/central California coast at 15 to 17 nm (13 to 15 miles; 28 to 31 km) from shore unless accessing a port. Ships carrying hazardous materials, such as refined petroleum, chemicals, and munitions, follow north-south tracks between 25 and 30 nm (29 to 34.5 miles; 46 to 56 km) from shore. Loaded tankers are required to stay at least 50 nm (57.5 miles; 93 km) offshore, while unloaded tankers are required to stay 25 nm (29 miles; 46 km) offshore.

The Port and Tanker Safety Act of 1978 provided broader regulatory authority over regulated and non-regulated areas. The act improved the supervision and control of all types of vessels operating in navigable waters of the US, and improved the safety of foreign or domestic tank vessels that transport or transfer oil or hazardous cargoes in ports or places subject to US jurisdiction (NOAA 2005b).

The Oil Pollution Act of 1990 established that parties responsible for discharging oil from a vessel or facility are liable for: (1) certain specified damages resulting from the discharged oil; and (2) removal costs incurred in a manner consistent with the National Contingency Plan (NCP). The liability for tank vessels larger than 3,000 gross tons was increased to $1,200 per gross ton or $10 million, whichever is greater. The fine for failing to notify the appropriate Federal agency of a discharge was increased from a maximum of $10,000 to a maximum of $250,000 for an individual or $500,000 for an organization, and the maximum prison term was increased from one year to five years. Civil penalties were authorized at $25,000 for each day of violation or $1,000 per barrel of oil discharged, and failure to comply with a Federal removal order can result in civil penalties of up to $25,000 for each day of violation (USEPA 2005).

State Regulations

Ballast Regulations

State regulations designed to minimize the uptake and the release of nonindigenous species through ballast water include the California Marine Invasive Species Act (AB 433, 2003), the California Coastal Ecosystems Protection Act (SB 497, 2006) and the Ballast Water Regulations for Vessels Arriving at California Ports or Places after Departing from Ports or Places within the Pacific Coast Region (2 CCR Sections 2280 through 2284, 2005). The Marine Invasive Species Act (AB 433, 2003) and the California Code of Regulations Title 2, Division 3, Chapter 1, Article 4.6 contain specific ballast water discharge requirements applicable to all vessels weighing 300 gross registered tons or more. Article 4.6 requires all vessels arriving at a California port or place from another port or place within the Pacific Coast Region to (1) exchange ballast water in near-coastal waters before entering the waters of the State if that ballast water was taken on in a port or place within the Pacific Coast Region, (2) retain all ballast water on board, (3) discharge the ballast water to a reception facility approved by the CSLC or (4) use an alternative, environmentally sound method of ballast water management that has been approved by the CSLC or the USCG. "Near-coastal waters" are defined in Article 4.6 as those waters that are more than 50 nm from land and at least 200 meters (656 feet) deep. "Pacific Coast Region" is defined in Article 4.6 as all estuarine and ocean waters within 200 nm of land or less than 2,000 meters (6,560 feet, 1,093 fathoms) deep, and rivers, lakes or other water bodies navigably connected to the ocean on the Pacific Coast of North America east of 154 degrees west longitude and north of 25 degrees north latitude, exclusive of the Gulf of California. The Coastal Ecosystem Protection Act (SB 497, 2006) requires the state to adopt ballast water performance standards by January 2008 and sets specific deadlines for the removal of different types of species from ballast water applies to all commercial vessels.

California Clean Coast Act

The California Clean Coast Act, which became effective on January 1, 2006, prohibits the release from large passenger vessels (cruise ships) and other oceangoing ships (300 gross tons or more) of hazardous waste, oily bilge water, other waste, and sewage sludge into the marine waters of the state and marine sanctuaries. The Clean Coast Act also prohibits the release of graywater from cruise ships and oceangoing ships with sufficient holding capacity into the marine waters of the state. Furthermore, the Clean Coast Act requires the State Water Resources Control Board to request the appropriate federal agencies to prohibit the release of wastes from cruise ships and oceangoing ships into state marine waters and the four National Marine Sanctuaries in California.

3.10.3 Significance Criteria and Impact Methodology

Significance Criteria

The Proposed Action would result in a significant impact on marine transportation if its implementation would result in the following:

- Injury or death;
- Spillage of oil or other hazardous materials into the waters of the ROI;
- Displacement of vessels in harbors within the ROI; or
- Delay of commercial vessel traffic for over one hour.

Impact Analysis Methodology

The proposed regulatory changes may impact vessel operations. The analysis includes an assessment of the following:

- Commercial shipping, which includes both domestic and foreign passenger vessels, such as cruise ships, dry cargo freighters, and tankers;
- Navy and Homeland security vessels that use, traverse, or patrol sanctuary waters; and
- Vessels associated with marine research facilities within the sanctuaries that conduct surveys and experiments from specially equipped research vessels.

Data for the above were obtained from NOAA, the USCG, USACE, Harbor Districts, California Department of Boating and Waterways, and other government agencies. In addition, interviews with selected members of the marine transportation industry and selected facility operators in the affected area provided information on how proposed changes in regulations could impact operations. The overall methodology is consistent with CEQ guidance and NOAA NEPA guidelines (NAO 216-6).

3.10.4 Cross-Cutting Regulations –Environmental Consequences

The cross-cutting regulations identified in Table 2-1 include those regulatory changes that are similar in all of the three sanctuaries. The impacts resulting from these cross-cutting changes are discussed separately from regulations that may apply to only one or two sanctuaries to reduce redundancy in this EIS.

The Proposed Action

Discharge Regulation Clarifications, Marine Sanitation Devices and Graywater

The proposed action would revise regulations to prohibit sewage discharges/deposits from within or into the three sanctuaries from vessels of 300 GRT or more. The prohibitions would only apply to vessels with sufficient holding tank capacity to hold sewage while within the sanctuary. The proposed action would also amend the exception to the prohibition on discharging or depositing graywater from within or into the MBNMS. The revised regulation would provide an exception for discharging or depositing graywater from vessels less than 300 GRT, and vessels 300 GRT or greater without sufficient holding tank capacity to hold graywater while within the MBNMS. Discharge of graywater is currently prohibited in the CBNMS and GFNMS.

The Proposed Action prohibits the marine discharge/deposit of any material or other matter, except the following:

- Fish, fish parts, or chumming material used in lawful fishing activities;
- For vessels less than 300 GRT (or vessels over 300 GRT that do not have sufficient holding tank capacity), clean effluent incidental to vessel use and generated by a Type I or Type II MSD;
- Clean vessel deck washdown, vessel engine cooling water, vessel generator cooling water, anchor wash, or bilge water; and
- Vessel engine or generator exhaust.

These prohibitions would result in less than significant impacts on marine transportation; the impact discussion is broken down into ballast water and other discharges.

Ballast Water Discharges. Ballast water discharge is already prohibited by the existing sanctuary discharge/deposit regulations. The impact of this restriction on vessel operations depends on the type of vessel, route characteristics, and weather patterns in question. Ballast water is used to ensure stability, trim, and structural integrity. According to the California State Lands Commission, the average ballast water capacity of various types of ships calling in California (Faulkner 2003) is as follows:

- Tank vessel – 6,371,000 gallons (24,117 cubic meters)
- Bulk carriers – 5,386,000 gallons (20,388 cubic meters)
- Container vessel – 3,441,000 gallons (13,026 cubic meters)
- Passenger vessel – 766,500 gallons (290 cubic meters)

Tankers are generally loaded with products when calling at US West Coast ports. As a result, ballast water discharges are minimal on this stage of the trip. Most tankers depart the US West Coast without a load and thus must ballast prior to their voyage, but this would not exacerbate the problems associated with ballast water discharge in the ROI. In addition, the phase-out of single hulled tankers is reducing the amount of ballast water discharge because less ballast is required in double-hulled tankers to achieve safe operating conditions (Chapman 2004).

Cargo vessels may require ballast water while transiting the California Coast. Generally, cargo vessels on transpacific routes are able to manage ballast water at-sea outside of the NMS boundaries (Stewart 2004). Vessels operating on coastal routes also are required to manage their discharges and do not expect any changes in operations from the proposed regulations (Lawson 2004). However, ballasting may be required in order to safely operate the vessel under emergency conditions. . As the preface to the prohibitions list includes an exception for emergencies "threatening life, property or the environment," the proposed action would not prevent ships from discharging ballast water in an emergency.

The prohibition on discharges outside the sanctuaries does not state how far from the boundary such discharges may take place, because no set distance could be easily defined, given the many variables that factor into such a determination, such as speed and direction of ocean currents and the volume and type of the discharge. In the absence of set criteria, operators are likely to discharge their ballast water at a greater distance from sanctuary boundaries than previously, in order to avoid regulatory violations.

As stated before, the existing discharge/deposit regulation already prohibits the discharge of ballast water in the three sanctuaries. The proposed modifications to the discharge exceptions would not add any more constraints to this industry and thus the adverse impacts on the marine transportation industry would be less than significant. The Proposed Action would not result in any increased risk of injury or death, spillage of oil or other hazardous materials, displacement of vessels in harbors, or delay of commercial traffic.

Other Discharges. The proposed prohibition on discharges of oily waste from bilge water and on-board meals, the Type I or Type II MSD requirement for vessels under 300 GRT, and the limitation on deck wash materials would not cause a significant impact on the marine transportation industry. The proposed regulation prohibiting discharge/deposit of treated sewage, and graywater (in the MBNMS), from vessels 300 gross registered tons or more would apply existing law in state waters to the federal waters of the marine sanctuaries. The regulation would not restrict vessels without capacity to hold the waste while in a national marine sanctuary.

This prohibition would result in less than significant impacts on marine transportation. The proposed modifications to the discharge exceptions would not add any more constraints to this industry and thus the adverse impacts on the marine transportation industry would be less than significant.

Current state and federal regulations already limit the types of discharge that may occur in the sanctuaries and along the coast of California, and most operators would not be required to implement any changes in order to comply with the Proposed Action.

The prohibition on the discharge of wastes from on-board food materials would not significantly impact commercial vessel operations. For commercial vessels other than cruise ships, the amount of food waste generated while within the NMS boundaries is limited and can be stored until the ship is outside the boundaries and then disposed of according to MARPOL and Coast Guard standards, or stored until it could be disposed at an onshore facility. The prohibition on the discharge of deck washing material would not significantly impact vessel operations, because this type of activity does not need to take place while the vessel is transiting the NMS.

Impacts on the marine transportation industry from the Proposed Action with regards to other discharges are not expected to be significant because the proposed rules are not anticipated to result in injury or death,

spillage of oil or other hazardous materials, displacement of vessels in harbors, or delay of commercial traffic for over one hour. In summary, the proposed regulations would not significantly affect the shipping industry.

Introduced Species

Aquatic organisms are often transported within the ballast water of ships, leading to the introduction of non-native species when the ballast water is discharged at the ship's destination. Vessels that are empty or loaded light typically take on a load of ballast water to improve the handling of the ship on rough seas; the water taken on is whatever is available, either fresh or seawater. Once the vessel is at or near its destination, the ballast water is pumped overboard, at the same time discharging whatever organisms may be present in the water. Impacts on marine transportation associated with this regulatory change are described above (see *ballast water discharge)*. This would result in a less than significant impact on marine transportation.

Cruise Ship Discharges and Definitions

In addition to the above restrictions, the new regulations would prohibit discharge by cruise ships of treated or untreated graywater, black water, and other waste products. Cruise ships remain closer to shore than some of the other types of vessels, in order to avoid rough water. In addition, cruise ships have a much smaller payload in terms of weight than other types of vessels. As a result, cruise ships have a minimal need for ballast water (Valenti 2004).

Cruise ships usually have enough storage capacity for graywater and black water to accommodate vessel operations for between one and two days, although there are variations between specific ships (Pruitt 2004). Vessels that have installed advanced treatment water devices generally have less storage capacity than those without these systems because a portion of the storage capacity has been converted into processing facilities. Cruise ships travel at between 15 and 20 knots, so the transit through the National Marine Sanctuaries from San Francisco is only a few hours duration. Cruise ships that call in Monterey are in harbor for up to 12 hours (7 AM or 8 AM until 3 PM or 6 PM). These operations are able to meet the requirements of zero discharge considered under the proposed action.

Zero discharge of gray and black water under the proposed action would result in less than significant impacts on cruise ship operations.

First, as explained above in the ballast water discussion, the regulations do not state how far a discharge must be from a sanctuary boundary to ensure no injury to sanctuary resources. Prohibiting wastewater that is discharged outside of sanctuary boundaries from entering the sanctuary has the de facto effect of expanding the boundaries of the sanctuary. Due to the limits of wastewater holding tanks this may affect the ability of cruise ships to store wastewater, limit the time that they can spend in the sanctuary, and increase the distance they must sail from shore in order to discharge wastewater. However, because cruise ships are in transit through the sanctuaries for only a limited time, these burdens would be minor and would not result in any significant impacts on cruise ship operations.

Second, the federal government and some coastal states have implemented gray- and black-water discharge protocols that impose varying standards on cruise ships. Federal and state laws enacted in Alaska in 2000 and 2001 set some of the most restrictive discharge regulations in the country (P.L. 106-554; Alaska Statute [AS] 45.03.460-AS 46.03.490), and Maine adopted the same standards in 2003 (Maine Legislative Document 1158). Other states, including Florida, Washington, and Hawaii, have entered into voluntary agreements with the cruise industry to manage waste from cruise vessels.

Regulatory standards vary from state to state and internationally;.. This perceived lack of consistency between jurisdictions (including the affected marine sanctuaries) could increase the burden of compliance on cruise ship operators. However, because of the availability of information about sanctuary regulations and of programs to educate the industry, this possible burden would not increase the risk of accidental discharges.

The prohibition on the discharge of food materials would not significantly affect cruise ship operations. Cruise ships generate a large volume of food waste but have on-board equipment, such as macerators and incinerators, that reduce the volume of the food waste. The limited amount of waste generated during the actual transit through the marine sanctuaries will not significantly impact the ability of the ships to store it and discharge it outside the sanctuary in compliance with MARPOL and Coast Guard regulations.

In summary, the proposed regulations banning discharges in the sanctuaries would not significantly affect the cruise ship industry.

Alternative Regulatory Actions

Cruise Ship Prohibition Alternative

This provision would result in similar impacts on marine transportation as the Proposed Action. Instead of preventing all cruise ship discharge into the sanctuaries, this provision would allow cruise ships to discharge properly treated effluent so long as it can be shown to be in compliance with the water quality standards established by the US Coast Guard in Alaska at 33 CFR 159, Subpart E (Discharge of Effluents in Certain Alaska Waters by Cruise Vessel Operators) and USEPA (as described in the Consolidated Appropriations Act, 2001, Pub. L. No. 106-554, § 1[A][4], 114 Stat. 2763, 2763A-315-2763A-316 [2000]). Such proof would comprise a discharge plan with associated maintenance logs, approved by NMSP prior to entry into the sanctuaries. This alternative would allow cruise ship operators to discharge in the sanctuaries instead of holding their waste until the ships are well outside the sanctuary boundaries. However, it could increase the regulatory burden on operators in a minor way by obligating them to submit discharge plans, including maintenance logs and demonstration of ability to meet standards, for approval prior to entry into the sanctuaries. This alternative would not result in a significant impact on marine transportation.

The No Action Alternative

The No Action alternative would be to continue to manage the sanctuary as it is currently managed. This would result in no impact on marine transportation.

3.10.5 Cordell Bank National Marine Sanctuary – Environmental Consequences

The Proposed Action

The proposed regulations regarding seabed disturbance and benthic habitat protection would not result in marine transportation impacts at CBNMS.

Alternative Regulatory Actions

Proposed alternative actions at CBNMS regarding seabed disturbance and benthic habitat protection would not result in any impacts on marine transportation.

The No Action Alternative

The No Action alternative would result in no additional impacts on marine transportation.

3.10.6 Gulf of the Farallones National Marine Sanctuary – Environmental Consequences

The Proposed Action

None of the proposed regulations specific to GFNMS would result in impacts on marine transportation, with the exception of the proposed prohibition on anchoring a vessel in a designated seagrass protection zone. The discharge from outside the sanctuary regulation is described for clarity.

No-Anchoring Seagrass Protection Zones

Prohibiting anchoring a vessel in a designated seagrass protection zones in Tomales Bay, except as necessary for mariculture operations conducted pursuant to a valid lease, permit, or license would have the potential to create minor adverse impacts on marine transportation for vessels currently anchoring in the proposed zones. The total estimated size of the no-anchor seagrass protection zones affected by this regulation is approximately 654 hectares, which comprises approximately 22% of Tomales Bay. The zones were designed so that they do not include areas adjacent to marinas or other recreational day use areas where boaters are known to anchor.

Because Tomales Bay is shallow and there are no substantial human population centers or industrial development along the shore, there is no commercial shipping industry in the Bay. Most vessel transportation is limited to recreational vessels (sailboats, pleasure craft, recreational fishermen) and some commercial vessels (fishermen, mariculture industry). Though the regulation would require vessel operators to anchor outside of these designated zones, it would not prevent vessels from using and transiting through the Bay. Furthermore, vessel operators could anchor in the remaining 78% of the Sanctuary. Because this regulation does not limit actual vessel use, and there are alternatives for anchoring a vessel outside of designated zones, the adverse impacts on the marine transportation industry would be less than significant. The analysis of potential impacts to fishing is further described in section 3.06 (fisheries) and the impacts to recreational users are described in section 3.11 (public access and recreation).

Water Quality – Discharges From Outside the Sanctuary

The proposed regulation would prohibit discharging or depositing any material or other matter from beyond the boundary of the Sanctuary that subsequently enters the Sanctuary and injures a Sanctuary resource or quality. This regulation proposes the same exceptions as the cross-cutting "discharge within or into the Sanctuary" regulation and would have similar beneficial and less than significant adverse impacts to land use and development as those described in section 3.10.4 for the cross-cutting discharge regulation clarifications. Potential marine based sources of pollution include discharges from transiting and wrecked ships, and underwater pipelines).

Under normal operation at sea, marine vessels may discharge several different types of wastewater, as described in section 3.5.1 (Water Quality). However the threat of any one vessel, under normal operating procedures, discharging outside a Sanctuary that subsequently enters Sanctuary and injures to a Sanctuary resource is very small. Discharges from transiting vessels tend to very rapidly mix with open ocean waters and dilute individual pollutant sources to levels that are not likely to injure to Sanctuary resources. The proposed regulation, therefore, is targeted at those high volume or harmful discharges, such as such oil, fuel, untreated sewage, and hazardous spills or deliberate releases that are capable of entering the Sanctuary and injuring a Sanctuary resource. At this time, the NMSP is not aware of any marine vessel that, through their normal activity would be impacted by this regulation. Therefore, the proposed regulation would have less than significant adverse impacts on marine transportation.

Alternative Regulatory Actions

No alternative language is proposed that would affect marine transportation.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on marine transportation.

3.10.7 Monterey Bay National Marine Sanctuary – Environmental Consequences

The Proposed Action

No additional impacts on marine transportation at MBNMS are expected other than those already identified and discussed above under the cross-cutting regulations discussion. Proposed regulations may affect the use of MPWC, but this is discussed in Section 3.11, Recreation. Including the Davidson Seamount in MBNMS would not impact marine transportation, other than by expanding the area in which discharge is generally forbidden. However, as this is at most a less than significant impact, the fairly minimal expansion of the MBNMS boundary would not result in any measurable adverse impact on marine transportation.

Alternative Regulatory Actions

There would be no impacts on marine transportation as a result of the alternatives.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on marine transportation.

3.10.8 Cumulative Impacts

Commercial marine transportation is subject to increasing amounts of regulation on the federal and state level. Commercial vessel operators are currently able to safely operate under a number of state and federal regulations that govern the types of discharge activities that may occur from commercial vessels. However, these existing regulations cumulatively put an increasing burden on vessel operators with regards to when and where operations such as ballast water discharge may occur, allowable navigation routes, and other operational constraints.

Implementation of the FMPs will contribute to the ROI's regional ecosystem health by applying the various action plans in CBNMS, GFNMS, and MBNMS. Implementation of wildlife disturbance management actions described in the GFNMS and MBNMS action plans will provide staff with information necessary to better manage vessel traffic and activities within the two sanctuaries. New management in GFNMS designed to address vessel spills would have similar results concerning marine transportation. New cruise ship discharge and MPWC management efforts in the MBNMS action plan would also have similar results.

One potential cumulative program that would interrelate with the proposed GFNMS prohibition on anchoring in seagrass beds is the Tomales Bay vessel management plan, which is currently being developed by a Technical Advisory Committee consisting of 10 agencies with jurisdiction over the waters and submerged lands of the Bay. The plan provides an overview of recommendations and actions for operation of vessels in Tomales Bay, and includes an evaluation of existing boating facilities. The plan will include recommendations for facility improvements, as well as provisions for establishing education programs to inform users about responsible boating practices. This plan is part of a multi-agency effort to coordinate vessel operations for

the benefit of the public as they seek to improve water quality, protect wildlife and habitats, and ensure public health and safety of water related activities and recreational uses of Tomales Bay.

Proposed Action

The proposed actions will contribute to a cumulative adverse trend affecting vessel operations in the sanctuaries. While the Proposed Action would not result in a significant direct impact on marine transportation, it may contribute to an adverse cumulative impact on vessel traffic in the ROI by way of this increased regulatory burden. However, this cumulative effect would not be significant.

Implementation of the Tomales Bay boating management plan would provide positive effects on marine transportation and would offset any minor adverse effects of the seagrass anchoring prohibition. When considered together with the proposed seagrass anchoring regulation, the implementation of this boating management plan would result in a slight net positive cumulative effect on marine transportation. The Proposed Action would not contribute to this beneficial impact.

Alternative Regulatory Actions

Cumulative impacts would be the same as those described under the Proposed Action, with a minor increase in the level of adverse impacts due to the increased size of the area in which discharge is prohibited because of the larger size of Davidson Seamount, and because of the obligation to maintain discharge logs under the Cruise Ship Prohibition Alternative.

The No Action Alternative

Under the No Action alternative, there would be cumulative adverse trends to marine transportation due to the continuation of existing levels of resource management in the sanctuaries, as well as cumulative beneficial trends in boating management in Tomales Bay. However, no change to existing regulations would occur; therefore there would be no contribution to any cumulative impacts.

3.11 PUBLIC ACCESS AND RECREATION

This section addresses public access and recreational issues (recreational fishing, boating, wildlife watching, surfing, motorized personal watercraft use, and onshore activities) related to the Proposed Action. The ROI for public access and recreation encompasses the boundaries of the marine sanctuaries, the Davidson Seamount area, and access and recreational activities adjacent to the sanctuary boundaries that may be affected by proposed management of the sanctuaries.

3.11.1 Regional Overview of Affected Environment

The waters and adjacent shoreline of the three sanctuaries host a variety of recreational activities. Most of the visitor use related to the sanctuaries is concentrated in adjacent coastal areas, particularly at the main access points distributed along the shoreline. Many of these access points offer services and facilities for both day and overnight use of coastal and nearshore areas.

The main marine-related recreation activities that occur in the three sanctuaries are beach visitation, coastal hiking, tidepool walking, fishing, scuba diving (both consumptive and non-consumptive), pleasure boating, whale and other wildlife watching, surfing, windsurfing, kayaking, and personal watercraft use (Ehler, Leeworthy and Wiley 2003).

As quantitative sanctuary-specific data regarding marine-related recreation activities are difficult to collect and often incomplete, Table 3-9 presents the major marine recreation activities and participation for the State of California in 2000. Beach visitation was the recreation activity with the most participation, with 12.6 million

Table 3-9
California Marine Recreation

Activity	Number of Participants (millions)	Number of User Days (millions)
Beach Visitation	12.6	151.4
Visiting Watersides Besides Beaches	1.5	20.7
Swimming	8.4	94.6
Snorkeling	0.7	3.8
Scuba Diving	0.3	1.4
Surfing	1.1	22.6
Windsurfing	0.1	-
Fishing	2.7	20.3
Motorboating	1.5	11.6
Sailing	1.1	6.8
Personal Watercraft Use	0.7	2.9
Canoeing	0.2	-
Kayaking	0.4	-
Rowing	0.3	-
Water-skiing	0.3	3.3
Bird Watching	2.6	65.8
Viewing Other Wildlife	2.6	38.6
Viewing or Photographing Scenery	4.2	107.9
Hunting Waterfowl	0.1	-

Source: Source Ehler, Leeworthy and Wiley 2003.

participants in 151.4 million days. The activities with the next highest number of participants in terms of days were viewing or photographing scenery (4.2 million participants in 107.9 million days), followed by swimming (8.4 million participants in 94.6 million days), and then bird watching, viewing other wildlife, surfing, visiting watersides besides beaches and fishing (Ehler, Leeworthy and Wiley 2003). A selection of popular recreational activities within the sanctuaries is discussed in more detail below.

Offshore Recreation

The major marine recreational access areas within or adjacent to the sanctuaries are the harbors at Monterey, Moss Landing, Santa Cruz, Pillar Point, San Francisco, and Bodega Bay. Other bays within the sanctuaries (e.g., Tomales Bay) are popular for recreational uses such as wildlife watching, sailing and kayaking.

Recreational Fishing

Sport fishing involves a large number of recreational users in both nearshore and offshore waters. A search of the Pacific States Recreational Fisheries Information Network (www.recFIN.org) database indicates that anchovy, jacksmelt, rockfish, mackerel, surfperch, mackerel, sanddab, salmon, and striped bass are among the major species taken by recreational fishermen in northern California. GFNMS may account for the state's largest salmon party boat fishery (out of San Francisco Bay). Bodega Bay and Duxbury Reef are among the most popular areas for rockfish fishing in the sanctuary. The waters around the Farallon Islands have also been used for rockfish fishing, but a groundfish closure in specified depths for federally managed species has been in place since 2001, which has redirected most recreational rock fishing opportunities to the nearshore (see Section 3.6, Commercial Fishing). According to the Bodega Harbormaster, prior to the groundfish closure, one large party boat made approximately 100 trips annually to Cordell Bank, and six other party boats each made about 30 to 40 trips annually (Black 2004). In 2000, approximately 440,000 saltwater anglers, mostly California residents, fished the Pacific Ocean off the coast of northern California (from Monterey County north) over 2.2 million days (Ehler, Leeworthy and Wiley 2003).

As presented in Table 3-10, northern California residents' preferred mode of fishing was by use of private/rental boats or from the shore. Most nonresident anglers fished from party/charter boats (Ehler, Leeworthy and Wiley 2003).

Table 3-10
Estimated Number of Days Fished and Participants in Northern California by Mode and Resident Status (2000)

	Resident	Nonresident	Total
Total Days	2,074,628	92,377	2,167,005
Party/Charter Boat Days	198,267	39,429	237,696
Private/Rental Boat Days	963,959	30,961	994,920
Shore Days	912,402	21,987	934,389
Total Participants	387,927	51,221	439,148
Average Days Per Participant	5.3	1.8	4.9

Source Ehler, Leeworthy and Wiley 2003

Wildlife Watching/Sailing

Whale watching, Farallon Island trips, and pelagic birding excursions organized by private whale watching operations, fishermen, and other environmental education groups account for several thousand visitors venturing offshore. Visitation to the Elkhorn Slough National Estuarine Research Reserve, a popular bird watching area on Monterey Bay, has significantly increased from 20,000 visitors in the mid-1980s to over 50,000 visitors in the mid-1990s (Ehler, Leeworthy and Wiley 2003). In addition to offshore whale watching, thousands of people every year travel to coastal areas of these sanctuaries to observe marine mammals and seabird rookeries and haul out areas. Some of the most popular places to see sea lions, harbor seals and elephant seals include: Pt. Reyes National Seashore, Bolinas Lagoon, Año Nuevo State Park, Cannery Row in Monterey, Pebble Beach, and San Simeon.

Sailing and powerboat clubs in San Francisco, Santa Cruz and Monterey Bay sponsor ocean and bay races at various times throughout the years; these races often use the calmer waters within Monterey Bay or may extend from San Francisco to the Farallon Islands (NOAA 1980; NOAA 1984).

White Shark Diving

The white shark (*Carcharodon carcharias*) is the world's largest predatory fish, and can reach 21 feet (6.5 meters) in length and weigh up to 4,800 pounds (2,100 kilograms). In GFNMS white sharks may be seen any time throughout the year. However, adjacent to the Farallon Islands researchers have observed a seasonal peak from September to November, when they hypothesize that larger numbers of white sharks migrate to the Islands and opportunistically feed on abundant northern elephant seals and California sea lions.

A recreational sport that has become more popular in the last five years in the Farallon Islands is white shark diving. Shark diving allows shark enthusiasts and researchers from around the world an easy way to observe white sharks. Shark cages are used to allow participants to safely observe and experience sharks up close while being protected behind a safe cage-like barrier.

Some operators increase the chances of their customers viewing white sharks by actively attracting them to a dive area using decoys, lures, blood, fish parts, or animal carcasses. Shark viewing can occur from the deck of the boat or underwater by placing divers in metal cages.

Commercial white shark expeditions at the Farallones are primarily offered from September to November. There are currently at least two known commercial operations that offer seasonal cage diving expeditions to view white sharks in GFNMS and at least one group that conducts opportunistic diving but does not operate a commercial venture. In years past, as many as eight white shark diving operations have operated at the Farallones. Currently no commercial operation derives all of its income from shark diving operations at GFNMS since the actual shark season is so short and unpredictable. As such, any income derived from commercial operations at the Farallones supplements income from other activities (such as shark diving and adventure operations in Mexico or Ecuador) or from other business activities altogether.

During the white shark season in fall 2005, the commercial companies conducting white shark dive trips at the Farallon Islands planned on offering a combined total of at least 71 full-day trips. Each company can accommodate a maximum of eight cage divers and four topside observers each trip. In addition, another non-profit group anticipates taking up to 15 people cage diving during the entire season. Thus, for 2005, the estimated maximum number of people conducting this activity is approximately 583 cage divers and 284 observers from the boat (NOAA 2005c). Variables such as weather and oceanographic conditions, alterations

in the shark's primary food source, approach by other vessels, predatory events on white sharks by killer whales, consumer demand, and other unforeseen events, could affect commercial viewing operations in the Farallon Islands area, and therefore could reduce the number of trips and yearly observations. The impact of this industry on white sharks is a topic of controversy; several studies are under way to evaluate its impact on the behavior and health of sharks and other marine species.

Surfing

In California, the sport of surfing saw a huge jump in participation rates between 1992 and 2002. According to the California Outdoor Recreation Plan, 6.1 percent of California residents participated in surfing in 1992, but by 2002 this rate of participation had more than doubled to 12.4 percent. At the same time, however, the average number of days that people surfed actually declined. In 1992 the average number of days surfed to the total state population was 3.0, and this fell to 2.1 in the 2002 survey. Even more dramatic was the drop in the average number of days spent surfing for those who participated in surfing; in 1992, surfers averaged 49.2 days in the water, but in 2002 they averaged just 16.5 days surfing. The central coast of California is one of the most popular surfing areas in the world, serving as home to roughly 45 percent of the nation's 1.6 million surfers (Ehler, Leeworthy and Wiley 2003). Surfing-related expenditures by resident surfers and surfers who travel to over 50 spots along the central coast contribute considerably to local economies (Ehler, Leeworthy and Wiley 2003).

Motorized Personal Watercraft

MPWC, also known by the brand names of the popular models Jetski and Waverunner, are small, fast, and highly maneuverable craft that possess unconventionally high thrust capability and horsepower relative to their size and weight. This characteristic enables them to make sharp turns at high speeds and alter direction rapidly while maintaining controlled stability. Their small size, shallow draft, instant thrust, and "quick reflex" enable them to operate closer to shore and in areas that would commonly pose a hazard to conventional boats operating at comparable speeds. Many can be launched across a beach area, without the need for a launch ramp. Most MPWC are designed to shed water, enabling an operator to roll or swamp the vessel without serious complications or interruption of vessel performance. The ability to shunt water from the load carrying area exempts applicable MPWC from Coast Guard safety rating standards for small boats. MPWC often are designed to accommodate sudden separation and quick remount by a rider. MPWC are not commonly equipped for night operation and have limited instrumentation and storage space compared to conventional vessels. Many MPWC propelled by a directional water jet pump do not have a rudder and must attain a minimum speed threshold to achieve optimal maneuverability.

Water jet-propelled MPWC gained mainstream popularity in the US in the 1980s, and sales accelerated through the mid-1990s. Their size, power, speed, and sophistication have advanced steadily. Some current models can carry up to 4 passengers and achieve maximum speeds between 30 and 60 or more miles per hour. Engine size, horsepower ratings, and vessel range and endurance have increased over time.

The two primary uses for MPWC in MBNMS are public safety and recreation. The main type of public safety use of this type of vessel is for search and rescue, although some patrol work is also performed using MPWC. Additionally, public safety organizations, including some from outside the Sanctuary, conduct MPWC training sessions in the Sanctuary in order to prepare for search and rescue work. Recreational use of MPWC in MBNMS includes two categories, general recreational riding and tow-in surfing. Because the waters of MBNMS are generally colder and rougher than those of inland lakes and reservoirs, few MPWC owners

choose to ride in the Sanctuary rather than in lakes, and as a result there is little of this type of recreational activity. However, MPWC use for tow-in surfing has increased in the past five years.

In 2002, the California Outdoor Recreation Plan surveyed California residents on their use of MPWC. According to this survey, 13.6 percent of California residents use MPWC. All residents average 1.7 hours of MPWC use per year, while active participants average 12.4 hours of use per year. MPWC use statistics were not available for previous years (California State Parks 2002).

Registrations of personal watercraft have grown more rapidly than other types of boats. Between 1995 and 2003 the number of personal watercraft registered in California grew by more than 62 percent, increasing at an average annual rate of 6.2 percent. For the six counties that border MBNMS, MPWC registrations grew at a slower rate than for the state as a whole. These counties (i.e., Marin, San Francisco, San Mateo, Santa Cruz, Monterey, and San Luis Obispo) saw MPWC registrations grow by an average of 5.0 percent per year. The strongest growth rates were the southern counties, with Santa Cruz growing at 8.4 percent per year, Monterey at 6.5 percent, and San Luis Obispo at 8.9 percent per year (California State Parks 2002). These three counties comprise the majority of the MBNMS shorelines.

Formal statistics documenting the use of MPWC within the boundaries of MBNMS are not collected by the California Department of Motor Vehicles, the California Department of Boating and Waterways, California State Parks and Recreation, or local harbormasters. However, based upon reports from harbormasters and NOAA enforcement personnel, MBNMS estimates that 1,200 MPWC trips were conducted in the Sanctuary in 2002, which represents repeated activity of approximately 150 individual MPWC. By contrast, the Florida Keys National Marine Sanctuary, one-third smaller in size than MBNMS, had approximately 1.3 million MPWC trips during the same time period.

The California Boating Facilities Needs Assessment (CBFNA), completed in October of 2002, provides some information on where MPWC are used (California Dept. of Boating and Waterways 2002). There is little information on GFNMS or CBNMS; however, the greatest amount of MPWC use is located in MBNMS and is the focus of the impact analysis. The CBFNA provides information on vessel use by region. Two regions, the San Francisco Bay Area and Central Coast, border MBNMS. The San Francisco Bay Area includes three counties that border the Sanctuary (Marin, San Francisco, and San Mateo) and five that do not (Alameda, Contra Costa, Napa, Santa Clara, and Solano). The Central Coast region includes just three counties, all of which border MBNMS (Monterey, San Luis Obispo, and Santa Cruz).

According to the survey in the CBFNA, residents of the San Francisco Bay region seldom use their MPWC (and other registered vessels less than 16 feet) in salt water. The results show that of those surveyed, only 17.3 percent reported using their vessels in salt water, and nearly all of this use was reported as occurring on San Francisco Bay. The only reported use of small craft within MBNMS was in Half Moon Bay, which accounted for just 4.0 percent of all use. Owners of MPWC and other small vessels that live in the Central Coast region also favor fresh water over saltwater. According to the survey, 84 percent of respondents listed various freshwater lakes and reservoirs as the most common area of operation, while 16 percent did not list a preferred water body.

This survey information is consistent with information gathered through interviews undertaken for this analysis. According to these interviews, most users of MPWC want to drive their boats at high speeds on warm water, which tends to rule out operating in the Pacific Ocean. In the ocean, the water is cold, and wave

conditions make it somewhat harder to go fast. Furthermore, MPWC tend to be used by more than one person on the same day. Typically, a group of people will find a stretch of beach on a lake or reservoir that allows the users to take turns operating the vessel from the shoreline. In the surf conditions on ocean beaches, this is problematic. Taken together, the survey and the interviews indicate that use of MBNMS accounts for a very small share of MPWC operations.

Another set of data that provides some indication of MPWC use is accident data collected by the California Department of Boating and Waterways. Personal watercraft accident rates for the counties that border MBNMS do not indicate an increase for the years 1996 through 2003. Assuming that there has not been a change in the relationship between the number of accidents and the number of hours used, this indicates that use of MPWC in these counties has not increased over the time period.

According to interviews, the majority of MPWC use in MBNMS occurs at surfing spots in San Mateo, Santa Cruz, and Monterey counties. Accident rates for these three counties are substantially lower than those for the six-county region (California Department of Boating and Waterways 2004; Rigby 2004). For the three-county region, the number of reported MPWC accidents averaged 3.5 incidents per year, and since 1999 that average was only exceeded in 2002 (California Department of Boating and Waterways 2004; Rigby 2004). It is important to remember that these statistics included reported accidents on both salt and fresh water, and that the survey results from the CBFNA show that most use occurs on fresh water. The majority of the MPWC use in MBNMS, and most or all of the growth in such use, is related to tow-in surfing. The difficulty lies in documenting just how popular tow-in surfing has become. Insufficient statistical data exist to document the growth of tow-in surfing, but anecdotal evidence suggests that this activity is a very small subset of surfing.

Information developed by NOAA in Ecosystem Observations for MBNMS (NOAA 2000) suggests that most of the surfing in Monterey Bay occurs in and around Santa Cruz. According to estimates in this document, the average daily number of people surfing in and around Santa Cruz is 300. In contrast, interviews with harbor personnel at Santa Cruz indicate that only 30 to 50 MPWC are launched there per year, and only 60 percent of these were for the purpose of tow-in surfing. This may be growing by 5 percent per year.

Field interviews also show that tow-in surfing is an extremely small portion of surfing. It is estimated that the Monterey Peninsula/Carmel Bay area has only six regular tow-in surfers, and that both Moss Landing and Santa Cruz have approximately the same number. However, tow-in is becoming increasingly popular at Moss Landing and around Monterey Peninsula. The Pillar Point area, most notably Mavericks, has the highest number of regular tow-in surfers, with as many as 20 two-man teams regularly operating there. Mavericks is a world-renowned big-wave location one-quarter mile off the coast of Half Moon Bay within the MBNMS. MPWCs are typically used at this site for access and safety precautions due to waves that can crest at over 50 feet and remarkably strong currents, jagged rocks, shallow reefs, and frigid water temperatures (Mavericks Surf Ventures, LLC 2006). MPWCs are commonly used at the Mavericks Surf Contest for photographers to document the contest and to rescue competitors when necessary. The harbors at Monterey, Moss Landing, Santa Cruz, and Pillar Point are the primary locations for launching MPWC within MBNMS. Morro Bay Harbor is also a launch site, but it is 15 miles (24 km) past the southern end of the Sanctuary and sees very little MPWC launch activity related to the Sanctuary.

Onshore Recreation

The predominant onshore recreational uses (most of which occur in the very shallow nearshore or along the shore adjacent to the sanctuaries) are beach-related activities, including coastal hiking, nature observation, tidepooling, surfing, windsurfing, clamming, abalone diving, surf fishing, and duck hunting (CDFG 1979; NOAA 1984).

Several onshore locations adjacent to the sanctuaries have become popular in recent years for wildlife watching. Large numbers of marine mammal enthusiasts and bird-watchers spend time along the sanctuaries' coastal estuaries and shorelines observing marine mammals, shorebirds, waders, and waterfowl. Popular locations include Elkhorn Slough, Pescadero Marsh, Santa Cruz, and Monterey in MBNMS and Bolinas Lagoon, Tomales Bay, Estero Americano, Estero de San Antonio, and Abbotts Lagoon in GFNMS. Birding excursions and field seminars organized by local environmental groups help introduce visitors to sanctuary wildlife resources.

3.11.2 Regulatory Environment

The recreation element of each land use plan identified in the Land Use and Development section (Section 3.9) regulates recreation adjacent to the sanctuaries. Other regulatory requirements and permit processes that affect recreation in the sanctuary areas include regulation of wetlands under Section 404 of the CWA by the USACE (see Section 3.7 for more detail) and management plans and permit systems by GGNRA and Point Reyes National Seashore and various state parks (mentioned above) that border sanctuary waters.

3.11.3 Significance Criteria and Impact Methodology

Criteria to determine the significance of impacts on public access and recreation are based on federal, state, and local standards and regulations. Impacts are considered to be significant if the proposed action creates the following:

- A temporary loss of recreational beach use for which there is no mitigation;
- A temporary disruption of land-based recreational resources, such as access to parks or recreational bicycle paths, for a period of more than two days, for which there is no mitigation;
- A long-term preemption of a recreational use or substantial temporary preemption during a peak use season; or
- A conflict with the objectives, policies, or guidance of federal, state and local plans.

Types of recreational uses in and around the sanctuary boundaries were determined and impacts were evaluated based on their sensitivity to the proposed regulatory changes. Also considered was the consistency of the proposed action with the objectives and policies of federal, state and local recreation plans.

The overall methodology, including data sources and assumptions, used to conduct the public access and recreation impact evaluation is consistent with the NOAA NEPA guidelines (NAO 216-6).

3.11.4 Cross-Cutting Regulations –Environmental Consequences

The Proposed Action

Introduced Species

Implementing stricter regulations to reduce the number of introduced species in the sanctuaries would have a beneficial impact on recreational resources. As stated in the Proposed Action, several types of introduced species inhibit the survival of native species and can result in changes in species composition, abundance and distribution and overall predator-prey relationships. This in turn may negatively impact important recreational activities, such as fishing, scuba diving, wildlife watching, and clamming. By implementing measures to protect the resources that support recreation, the Proposed Action would provide a minor beneficial recreational effect. Additionally, minor adverse impacts on recreational boaters are expected as a result of prohibiting releases of introduced species into the three sanctuaries.

Discharge Regulations Clarifications, Marine Sanitation Devices and Graywater

For vessels 300 or more gross tons, sewage discharges/deposits would be prohibited, as the vessels would be required to hold them while in the sanctuaries, if they have sufficient holding capacity. This proposed prohibition may decrease levels of contaminants in coastal waters and increase water quality. As a long-term impact, reducing pollution in the ocean would increase water quality and the health of the sanctuaries' ecosystems, both of which are key elements in recreation (e.g., fishing, scuba diving, wildlife watching, surfing, swimming and boating), and therefore the impact on recreational resources would be beneficial.

For vessels less than 300 gross tons, the proposed regulatory language modification clarifies that vessel operators must use a Type I or Type II MSD when discharging sewage, which is what is already required by the Coast Guard. The regulation would allow vessels to have a Type III MSD, but they could not discharge untreated waste into the sanctuary and would have to either discharge this waste at a harbor pump-out facility or outside the sanctuary according to Coast Guard regulations. Overall these regulatory changes would help improve water quality and thus improve recreational opportunities, such as diving, swimming, fishing, and surfing in the sanctuaries. This regulation essentially clarifies expectations to recreational boaters and does not add any significant burdens beyond what is already required by sanctuary or Coast Guard regulations. Therefore, no adverse effect on recreational use is associated with the modification.

The requirement to secure marine sanitation devices in a manner to prevent discharge of untreated sewage may pose a minor burden on boat owners who have not purchased a lock or clasp to ensure the effective operation of the marine sanitation device; however, the impact of this addition is negligible. Amending the language regarding discharge regulations would provide a slight beneficial impact on recreational resources within the sanctuary as a result of improved water quality, which contributes to the overall quality of recreational resources. See Section 3.5, Water Quality, for more details on proposed discharge regulations and their effects on water quality.

Cruise Ship Discharge and Definitions

The proposed regulations on cruise ships would provide a beneficial impact on recreational uses within the sanctuaries. The proposed regulation would eliminate potentially harmful discharges from cruise ships in sanctuary waters and would reduce the amount of oily water, hydrocarbons, and sewage released into the sanctuaries that can sicken, injure or even kill plants and animals exposed to their effects. As a long-term impact, reducing pollution in the ocean would increase water quality and the health of the sanctuaries'

ecosystems, both of which are key elements in recreation (e.g., fishing, scuba diving, wildlife watching, surfing, swimming and boating), and therefore the impact on recreational resources would be beneficial.

Alternative Regulatory Actions

Cruise Ship Prohibition Alternative

This alternative provision would result in cruise ships being allowed to discharge wastewater that has been properly treated to a level not to exceed the standards set forth by the US Coast Guard in Alaska at 33 CFR 159, Subpart E (see discussion about cruise ship wastewater discharges in Section 3.5, Water Quality). Because the wastewater would be treated to reduce nutrients (nitrogen and phosphorus) and reduce or eliminate the toxicity or hazardous properties of the wastes, the overall water quality would be improved and therefore have beneficial impacts on recreation (e.g., fishing, scuba diving, wildlife watching, surfing, swimming and boating). Although the discharged wastewater would be treated, there is still the potential for the discharges to contain harmful effluent (i.e., oily wastes, toxic chemicals, nutrients, pathogens, viruses), which can impair, injure or even cause death to living resources. As discussed in Section 3.5.4, some MSDs do not achieve the effluent standards they are designed to meet. Therefore, the beneficial nature of the impact would be slightly less than under the Proposed Action because no discharge (treated or untreated) would be allowed under the Proposed Action.

No Action

The No Action alternative would be to continue to manage the sanctuary as it is currently managed. This would result in no impacts on recreational resources.

3.11.5 Cordell Bank National Marine Sanctuary –Environmental Consequences

The Proposed Action

Wildlife Disturbance

Adding sanctuary regulations on the taking or possessing of protected wildlife within CBNMS would have a minor beneficial impact on recreational viewing activities, such as wildlife watching and scuba diving, by adding further protection of the resources that recreational users are interested in viewing. Since users are already subject to regulations that prohibit the taking or harassment of animals, the additional sanctuary regulations will not add any new burdens, other than the possible increase in enforcement of these regulations. The overall impact would be beneficial, however the benefit is very minor, as there are existing regulations protecting wildlife and the proposed regulation essentially mirrors existing regulations.

Seabed Protection

The proposed regulation would prohibit drilling, dredging, or altering, constructing, placing, or abandoning any structure material or matter on the submerged lands within the line representing the 50-fathom isobath surrounding Cordell Bank. Additionally, the regulation would prohibit the same activities listed above in the remainder of the sanctuary outside the 50-fathom isobath, with the exception of anchoring. The proposed regulation would result in enhanced protections for species and habitats by reducing or eliminating physical impacts and associated habitat loss and would result in positive impacts on biological resources at all trophic levels (i.e., within all categories of organisms, including fish, invertebrates, seabirds, and marine mammals). Therefore, the Proposed Action would have an indirect beneficial impact on recreation resources by

protecting the species and habitats that are the focus of several recreational activities, including fishing and diving. This regulatory change would result in a minor beneficial impact on recreational uses.

Benthic Habitat Protection

There is an existing benthic habitat regulation that prohibits the removal, taking, or injuring benthic invertebrates or algae on or within the 50-fathom isobath surrounding Cordell Bank, except for "accidental removal, injury, or takings during normal fishing operations." The proposed regulatory clarification would have the same amount of protection as the existing regulation and would result in negligible impacts on recreational activities.

Alternative Regulatory Actions

The alternatives would have the same impacts as identified in the Proposed Action, with the following differences.

Seabed Protection Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within a line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action. Under this alternative, NOAA would issue regulations under the authority of the NMSA prohibiting bottom-contact fishing gear within the 50-fathom isobath surrounding the Bank. Lawful use of fishing gear other than bottom-contact gear would be exempt from the regulation. This regulation would result in beneficial impacts on biological resources, and recreational uses such as recreational fishing and scuba diving, because in addition to prohibiting drilling, dredging, or altering, constructing, placing, or abandoning any structure material or matter on the submerged lands it would prohibit the use of bottom-contact fishing gear, which can snag, entangle, break-off, injure and remove fragile bottom habitats on Cordell Bank. The proposed definition of bottom contact gear would not apply to most, if any, recreational fishing activities. Therefore, this regulatory alternative would have slightly greater beneficial impacts for certain recreational activities, such as fishing or scuba diving, than described for the Proposed Action since it would regulate harmful impacts on biological resources resulting from the use of bottom contact fishing gear on Cordell Bank. However, it should be noted that bottom contact fishing gear is currently prohibited in the area pursuant to 50 CFR part 660 (Fisheries off West Coast States and in the Western Pacific).

Benthic Habitat Protection Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within the line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action. Under this alternative, in addition to the minor corrections and clarifications, NOAA would issue regulations under the authority of the NMSA prohibiting bottom-contact fishing gear within the 50-fathom isobath around the Bank. In addition, a new definition of bottom-contact fishing gear would be included in the sanctuary regulations, though this would not apply to most, if any, recreational fishing activities. Therefore, this regulatory alternative would have slightly greater beneficial impacts for certain recreational activities, such as fishing or scuba diving, than described for the Proposed Action since it would regulate harmful impacts on biological resources resulting from the use of bottom contact fishing gear on Cordell Bank. However, as noted above, bottom contact fishing gear is currently prohibited in the area.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on recreational resources.

3.11.6 Gulf of the Farallones National Marine Sanctuary –Environmental Consequences

The Proposed Action

Wildlife Disturbance

As described for CBNMS, stricter regulations on the taking or possessing of protected wildlife, such as marine mammals, sea turtles, and birds within GFNMS would have a beneficial impact on recreational viewing activities, such as wildlife viewing where their main intent is to see these Sanctuary resources in their natural habitat.

Deserted Vessels

Prohibiting marine vessel owners from deserting vessels and from leaving harmful matter aboard grounded or deserted vessels could indirectly be a beneficial impact on recreational resources. When a vessel is left unattended, there is a potential risk of discharge of harmful matter (e.g., fuel or motor oil) into the marine environment or risk of physically damaging habitats, impairing a majority of the recreational activities in the Sanctuary, including fishing, surfing, diving and swimming. Therefore, this regulatory change would result in a beneficial impact on recreational resources, by reducing the potential for harmful discharges that could affect recreation resources.

No-Anchoring Seagrass Protection Zones

As described in the Marine Transportation analysis (Section 3.10), minor adverse impacts on recreational boating in general may occur as a result of the proposed prohibition on anchoring a vessel in a designated seagrass protection zones in Tomales Bay, except as necessary for mariculture operations conducted pursuant to a valid lease, permit, or license. The total estimated size of the no-anchor seagrass protection zones affected by this regulation is approximately 654 hectares, which comprises approximately 22% of Tomales Bay. The zones were designed so that they do not include areas adjacent to marinas or other recreational day use areas where boaters are known to anchor.

Tomales Bay is a popular recreational area. Recreational boaters include small sailboats, pleasure craft, and recreational fishing vessels. Recreational fishing includes clamming on mudflats, California halibut and salmon fishing in deeper areas of the bay, and crab trapping. Recreational fishermen generally do not target their activity within seagrass, since that is not the primary habitat areas where salmon or halibut are located. Boaters, including recreational fishermen, generally avoid shallow areas of the Bay (which includes seagrass habitat) to avoid grounding, unless they are trying to "store" or anchor their vessels overnight or for longer periods. Due to the tidal extremes and the shallow depths along the shoreline, vessels may be completely exposed during low tide and rest directly on the seabed (or in seagrass).

Recreational vessel use within the Tomales Bay varies throughout the year, with a peak during the summer and fall months. The number of vessels recorded on one day within a one-hour period has been recorded as high as 449 vessels. Various agencies collect information on vessel use in Tomales Bay.

The Point Reyes National Seashore collects information on visitors who camp overnight on the west side of Tomales Bay within the boundaries of the park. There is a limit of 7,200 boat-in overnight camping permits per year. This data is limited to the number of camping permits issued at launch sites around the Bay and includes public and private areas. Day use within the Point Reyes National Seashore is more difficult to determine since there are so many entry points around the Bay that are accessible to boaters.

The California Department of Parks and Recreation also tracks the number of visitors to Tomales State Park. There is an estimated total annual visitation of 124,000 visitors to all units within the park. The water-based recreational usage varies among shoreline locations at the Park. The term "water-based recreation" covers beach use, swimming, and launching of kayaks and other vessels without motors. These counts are based on cars at parking lots at a particular time multiplied by a factor that reflects the number of passengers.

Marin County maintains a concrete boat launch ramp on Tomales Bay at Miller County Park. Although no accurate numbers are collected, this facility is likely used to launch motor-driven vessels, mostly 20 feet and under in length, as well as sailboats and kayaks.

According to California Department of Health Services, the number of boats using the launching facilities at Miller County Park has more than doubled since 1995 when 2,300 boats were reported to have used the launch site. In 2001, 6,000 boats were recorded by October. July was the busiest month at the Park for boat launches. This information was obtained from Marin County to California Department of Health Services, but it is not known how the boat numbers were derived since the Marin County Parks provided only car estimates for this report.

The California Department of Boating and Waterways used an aerial survey (conducted on Saturday, September 6, 2003, between approximately 1:00 – 2:00 pm) of the Tomales Bay waters to gather additional information on the number and size of vessels in Tomales Bay. The aerial survey resulted in a total vessel count of 449 vessels. This count included those vessels in the water, or on the immediate shoreline of Tomales Bay. Of these vessels, there were 146 power craft, 165 sailboats, 126 human powered craft (kayaks, canoes, sculling craft) and 12 unknown vessel types. Vessels have been observed through aerial photographs within current and historic eelgrass beds throughout Tomales Bay.

In addition, studies in other parts of the world have found that boat propellers, anchors and mooring lines can damage the underground root and rhizome system of seagrass, which can have long-term impacts on the health of the seagrass community. As vessels swing on their anchors, drag them in strong winds, or pull up their anchors, they can plow up seagrass beds, dislodging their stems and killing the plants. Also, prolonged anchoring or mooring can shade the seabottom and cut off light sources to seagrass beds. See additional information about biological effects and seagrass recovery rates in Section 3.3.8.

The proposed regulation would allow vessel operators to continue to sail, boat, fish or transit the Bay, and even anchor adjacent to marinas (since these areas are not included in the zones). Though the regulation would prohibit operators from anchoring a vessel in a designated seagrass protection zone, they could still anchor in the remaining 78% of the Sanctuary. Because this regulation does not limit actual vessel use, and provides alternatives for anchoring a vessel outside of designated zones, the adverse impacts on the public access and recreation would be less than significant.

White Shark Attraction and Approaching

The Farallon Islands are among the best places in the United States to see white sharks because they feed upon the young elephant seal, harbor seal, and California sea lion pups. The Proposed Action would prohibit white shark attraction activities throughout the Sanctuary and prohibit white shark-approaching activities from within 164 feet (50 meters) of any white shark within 2 nm (2.3 miles; 3.7 km) of the Farallon Islands (where the white sharks are most prevalent during feeding). The proposed regulation does not prevent any user, vessel or business from conducting shark viewing activities, however, it may reduce a company's ability

to predictably "attract" white sharks to their boat and offer a close encounter with the sharks. As such, this may reduce the number of people participating in this recreational activity.

This regulation would create an adverse impact on those specific recreational activities that use decoys and chumming to feed and attract sharks for white shark viewing (e.g., photography, filming, and cage diving). Most of this unregulated seasonal activity (September-November) in GFNMS is directed at white shark populations located between Mirounga Bay and Fisherman's Cove in the Southeast Farallon Islands (Absolute Adventures-Shark Diver 2003). As described in the Affected Environment, up to eight shark-related individual or ecotourism groups have operated at the Farallones in the past, but currently only two companies are known to conduct operations. During the white shark season in fall 2005, the commercial companies conducting white shark dive trips at the Farallon Islands planned on offering a combined total of at least 71 full-day trips (NOAA 2005c).

Noninvasive shark viewing would continue to be permitted within the 2 nm (2.3 miles; 3.7 km) boundary around the islands, and approaching would continue to be permitted elsewhere in the Sanctuary. Vessels would be allowed to observe natural white shark feeding behavior. Furthermore, some shark approach activities that have a legitimate research or education value (e.g., educational filming or white shark behavior studies) could be allowed through the issuance of a sanctuary permit. Therefore, this prohibition would result in a less than significant adverse impact on recreation. Economic impacts related to the shark diving businesses are addressed in Section 3.13.

Beneficial effects on other recreational activities may result from the proposed prohibition. By not attracting a top food chain predator, the possibility of sharks habituating to human activities would be reduced or eliminated. This may prove beneficial for other nearby in-water human users, such as surfers, kayakers, divers, and swimmers.

Oil and Gas Pipeline Clarification

The proposed change in regulations regarding the placement of oil and gas pipelines in GFNMS would have slight positive effects on recreational activities. Since pipelines would be permitted only for oil and gas operations that are adjacent to the Sanctuary, rather than oil and gas operations anywhere outside of the Sanctuary, the potential for future pipeline development would be more limited. Such limited pipeline construction would reduce the likelihood of any pipeline failure and spill. Therefore, the management measure would be a slightly beneficial impact on recreation by protecting water quality and health of marine wildlife that is the focus of several recreational activities, such as fishing and wildlife watching. However, there are no current oil and gas operations in the area and none planned in the near future.

Historical and Cultural Resources

Amending the administrative language regarding historical and cultural resources would have a minor positive impact on recreational resources within the Sanctuary. These cultural and historical resources will be protected and left in the Sanctuary for others to enjoy or even dive on.

Alternative Regulatory Actions

The alternatives would have the same impacts as identified in the Proposed Action, with the following differences.

White Shark Approach Prohibition Alternative

This alternative would provide a variation on the proposed regulations for approaching white sharks. Approaching would be prohibited throughout the Sanctuary rather than just within 2 nm (2.3 miles, 3.7 km) of the Farallon Islands. This alternative would have a slightly greater adverse impact on the existing white shark diving operators than as identified in the Proposed Action due to the greater level of restriction on their activities. However, as outlined for the Proposed Action, the overall adverse impact on recreation would be less than significant due to the very limited number of activities that actually rely upon the active attraction of white sharks in the GFNMS. Economic impacts related to the shark diving businesses are addressed in Section 3.13.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on recreational resources.

3.11.7 Monterey Bay National Marine Sanctuary–Environmental Consequences

The Proposed Action

Deserted Vessels

Similar to that describe in GFNMS, prohibiting marine vessel owners from deserting vessels could have an indirect beneficial impact on recreational resources. When a vessel is left unattended, there is a potential risk of discharge of harmful matter (e.g., fuel or motor oil) into the marine environment or risk of physically damaging habitats, impairing a majority of the recreational activities in the Sanctuary, including fishing, surfing, diving and swimming. Therefore, this regulatory change would result in a beneficial impact on recreational resources, by reducing the potential for harmful discharges that could affect recreation resources.

Boundary Changes - Davidson Seamount

Adding the Davidson Seamount to the boundary of MBNMS would have minimal impacts on recreation. Prohibiting or regulating activities that could impact benthic communities is not likely to have an impact on recreational uses since there is no evidence that any significant recreational activity takes place at Davidson Seamount.

Motorized Personal Watercraft

As described in Chapter 2, MPWC use in MBNMS is confined to four existing designated zones. However, some larger MPWC do not fall under the sanctuary's current definition of MPWC and therefore are not confined to the four zones. Altering the definition of MPWC to include a broader range of vessels, including increased rider capacity watercraft, would limit their operation to the designated MPWC zones, but a new seasonal zone would be established at the Mavericks surf area. The only exception to this regulation would be for emergency use by public safety agency personnel. For training of those public safety personnel during non-emergency situations, permits could be made available. Permits would be limited to training for public safety organizations with jurisdiction within the Sanctuary.

MPWCs are used in a variety of environments and in a variety of ways in the Sanctuary. One of the primary uses is for "tow-in" and "tow-at" surfing. In "tow-in" surfing, MPWC use has allowed surfers to catch waves that are too large and consequently traveling too fast to catch by paddling. According to interviews with surfers and state and local personnel, most tow-in surfing activity occurs in big-wave conditions (larger than

15 feet), which are most often associated with the storms that occur between October and March. However, MPWC use has spread to towing surfers into more moderately sized waves that can also be ridden by paddling. Additionally, there has been an increase in what is known as "tow-at" surfing where MPWC are used to sling a surfer at smaller waves at high speeds.

There have been some anecdotal reports of increased use of MPWC in traditional paddle-in surf spots, causing some conflict between the two types of surfers, as well as conflict between MPWC-users and other recreational uses of the Sanctuary, such as kayakers and wildlife-watchers. Restricting all MPWC to the designated zones would eliminate this conflict, which would have a beneficial impact on other recreational users in areas outside the MPWC zones.

Impact 1: Long-term Preemption of Tow-in Surfing. Eliminating all non-emergency MPWC from use outside the MPWC zones would result in a less than significant adverse impact by creating a long-term preemption of the recreational use of MPWC for "tow-in" and "tow-at" surfing in some areas such as Moss Landing and Pescadero Point. The establishment of a seasonal zone (as shown in Figure 2-5) would allow continued use of MPWC at Mavericks (off of Pillar Point) during high surf conditions in winter months. While the Mavericks surfing competition does not permit the use of MPWC for tow-in purposes, professional and recreational surfers practice at Mavericks using MPWCs, and MPWC are used during the competition by photographers, spectators, and rescue personnel. Establishing the seasonal zone at Mavericks would accommodate this recreational use; therefore overall impacts on this form of MPWC use would be less than significant. Impacts on other recreational MPWC use would not be significant because MPWC could still be used in the designated MPWC zones in the sanctuary.

The MBNMS MPWC Action Plan, Strategy "MPWC-2: Consider Zone Restriction Exceptions" provides information about how the sanctuary plans to comprehensively address MPWC use in the Sanctuary.

White Shark Attraction

Currently white shark attraction is already prohibited in state waters of MBNMS. This proposed regulation would extend the prohibition to federal waters to make the regulation more consistent throughout the entire Sanctuary and with the proposed regulation in GFNMS. However, unlike GFNMS where this activity occurs around the Farallon Islands, this activity does not occur in these deeper offshore waters of MBNMS because there are many fewer white sharks and they are not easily accessed in concentrated feeding areas such as the Farallon Islands. Therefore, no impact on this type of recreational use is expected.

Dredge Disposal – SF-12

Redefining and officially locating disposal site SF-12 would reduce the probability of accidental release of dredged material in areas of the Sanctuary used for recreation. The purpose of this proposal is to reduce impacts on local beaches and nearby harbors and estuaries caused by current disposal in the nearshore subtidal area. Movement of the site to the head of the Monterey Canyon may reduce existing impacts associated with dredged sediment being washed into the surf zone at Moss Landing and deposited in the beach, harbor and estuary areas. This action would have a beneficial impact on recreational activities, by improving the beach environment for recreational use.

Alternative Regulatory Actions

The alternatives would have the same impacts as identified in the Proposed Action, with the following minor differences:

Motorized Personal Watercraft Alternative

Impact 1: Long-term Preemption of MPWC Use. Prohibiting the use of all MPWC within the Sanctuary boundary would eliminate all MPWC from the entire MBNMS, not just outside the MPWC zones. This would be a significant impact on MPWC users.

Mitigation. Potential mitigation for this impact could include the issuance of specialized permits.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on recreational resources.

3.11.8 Cumulative Impacts

The ROI for cumulative public access and recreation encompasses the boundaries of the marine sanctuaries, the Davidson Seamount area, and access and recreational activities adjacent to the sanctuary boundaries that may affect the individual sanctuaries or management of the sanctuaries. Trends in recreational use and public access include increasing amounts of recreational development along the coastline, in conjunction with local, state, and federal planning efforts to protect natural resources that contribute to the recreational experience, and to preserve public access to these resources. Simultaneously, ongoing development in the ROI, as well as increasing population, in the ROI, are putting pressure on recreational uses, through over-use by the expanding population, and by the need for open land to develop for residential or commercial purposes. Specific types of projects that would affect recreational uses include almost all coastal development or construction, coastal armoring projects, harbor maintenance, and environmental restoration projects. Environmental restoration efforts such as the Big Lagoon Restoration Project contribute to the preservation of resources valuable for both ecological and recreational uses; harbor maintenance preserves the capacity of harbors to support recreational and commercial boating; and coastal armoring projects may damage natural resources while at the same time preserving public access to the coastline.

Faced with such pressures, planning agencies are forced to balance the sometimes conflicting needs of preserving public access and protecting natural and cultural resources, as too much public access may damage those resources that support recreational uses. County implementation of LCPs and the California Coastal Commission's regulatory overview all require planning to preserve public access and recreational uses, but not exclusive of natural resources protection. Near-term planning efforts that restrict recreational uses may indirectly result in long-term recreational benefits. In the long term, cumulative projects and planning efforts may have beneficial impacts on recreation, by preserving natural resources and recreational uses and guaranteeing public access to the shoreline in the ROI.

Additionally, implementation of the FMPs will contribute to the ROI's regional ecosystem health by applying the various action plans in CBNMS, GFNMS, and MBNMS. The action plans provide for public outreach and education, research, and coordination with other natural resources and planning entities, in order to preserve the resources of the sanctuaries and the ROI as a whole. Implementation of these plans would contribute to protection of the recreational resources in the sanctuaries, but might result in minor restraints on some recreational uses through management of the sanctuaries' sensitive resources.

One program that would intersect with the proposed GFNMS prohibition on anchoring in seagrass beds is the Tomales Bay vessel management plan, which is described in Section 3.10.8.

The Proposed Action

Recreational resources within the ROI are subject to both adverse and beneficial cumulative trends through better management and increased development pressure. While these are ongoing impacts, the Proposed Action would not contribute to a cumulatively significant adverse impact on public access or recreation in the ROI.

The Proposed Action may limit certain recreational uses (white shark attraction and use of MPWCs outside designated zones), but these prohibitions would enhance the recreational experience for other visitors to the sanctuaries, either directly by limiting the noise and disruption of MPWCs, or indirectly by preserving the natural resources that draw visitors to the area. Recreational resources in the ROI are subject to a cumulatively adverse impact from development pressure on recreational resources and from coastal armoring, which would reduce public access to the shoreline, reduce the natural landscape, increasing beach erosion and sand loss from the beach. However development and coastal armoring are both increasingly subject to regulatory constraints. The Proposed Action would not contribute to this ongoing adverse effect, because the long-term consequences of the Proposed Action for recreational resources would be beneficial.

The Proposed Action would contribute to cumulatively beneficial impacts on recreation from the cumulative projects that would also improve water quality and habitat. Such cumulative projects include the restoration projects, updating NPDES permits, and other planning efforts. Implementation of the Tomales Bay boating management plan would provide positive effects on recreational boating and would offset any minor adverse effects of the seagrass anchoring prohibition. When considered together with the proposed seagrass anchoring regulation, the implementation of this boating management plan would result in a slight net positive cumulative effect on recreational boating. Therefore, overall, the Proposed Action would result in a cumulative contribution to beneficial impacts.

Alternative Regulatory Actions

Cumulative impacts would be the same as those described under the Proposed Action, with an increase in the level of beneficial impacts due to the increased levels of resource protection afforded by these alternatives.

The No Action Alternative

The No Action alternative would be to continue to manage the sanctuaries as they are currently managed, although the action plans in the FMPs would be implemented. This would result in no contribution to beneficial or adverse cumulative impacts on recreational resources.

3.12 RESEARCH AND EDUCATION

This section addresses issues related to research and education activities that might be affected by the proposed actions. Research and education activities in the sanctuaries are summarized, and potential adverse effects are identified.

3.12.1 Regional Overview of Affected Environment

The research and education resources of the three sanctuaries are affected by the uses and activities within the study area. The ROI includes areas in which research and education facilities are located within and around the boundaries of the marine sanctuaries, the Davidson Seamount area, and areas adjacent to the boundaries that are affected or involved with the individual sanctuaries or management of the sanctuaries.

Goals of all three sanctuaries include promoting appreciation, public awareness, and understanding for the marine resources. Both education and research are important components of the Sanctuary programs.

The three sanctuaries provide a variety of outreach and education programs for teachers, students, resource users, and the general public. Sanctuary education and outreach efforts are focused in two general areas: (1) community involvement, partnerships, and community program development (training programs, workshops, special events, school programs), and (2) product development (printed materials, website development, audio visual materials, interpretive signs, displays and exhibits) as critical education and outreach tools.

Research and Education Activities

Cordell Bank National Marine Sanctuary

The majority of research and monitoring in CBNMS is conducted by or through the Sanctuary, Bodega Marine Laboratory, and the NOAA Fisheries. Each year, NOAA Fisheries assesses juvenile rockfish recruitment and every three years it surveys adult fish populations. The Sanctuary has conducted monitoring of Sanctuary conditions since 1997. Monitoring programs have included investigating oceanographic conditions and how they relate to the distribution and abundance of krill, seabirds, and whales. Since 2001, the Sanctuary and its partners have been characterizing benthic habitats on Cordell Bank and monitoring fishes and invertebrates on and around the bank. Education programs in CBNMS include a yearly lecture series, outreach events, presentations at local schools, teacher training, and wildlife viewing.

Gulf of the Farallones National Marine Sanctuary

Scientific research on both marine and estuarine ecosystems in GFNMS is led by the site staff, but mostly through its partners, including CDFG, GGNRA, PRNS, USFWS, EPA, USGS, NOAA Fisheries, local universities, volunteer groups, and the Pt. Reyes Bird Observatory (PRBO). Several government agencies and nongovernmental organizations conduct research programs in the area. PRBO Conservation Science and the USFWS coordinate research on the islands. The Sanctuary collaborates with these agencies and other institutions on conducting research to help characterize Sanctuary resources and understand natural and human factors responsible for causing changes in the marine environment.

Monterey Bay National Marine Sanctuary and Davidson Seamount

MBNMS's research program is focused on science for resource management, which includes determining information gaps, developing collaborative studies to improve understanding of issues, and interpreting research for decision makers. Over 40 research institutions utilize MBNMS for a variety of programs. Several

large-scale programs have been conducted to map habitats, monitor nearshore ecosystems, and model ocean circulation. Research activities cover a broad spectrum of activities, including monitoring birds, marine mammals, krill, gray whale migrations, kelp canopies, rocky shores, and water quality; characterizing pinniped rookeries, nearshore, offshore, and formerly restricted military zone seafloor habitats; and studying tidal erosion in Elkhorn Slough, distribution of introduced species, sea lion death, fishery impacts from trawling and gill net by-catch, coastal erosion, ship groundings and oil spills, and human use effects in kelp forest and rocky shore systems. An ecosystem monitoring program, entitled SIMoN, has been developed and is a key regional source of information. SIMoN is a long-term program that takes an ecosystem approach to identify and understand changes in the Sanctuary. The program enables researchers to monitor the Sanctuary effectively by integrating the existing monitoring programs and identifying gaps in information. By avoiding duplication of these programs, resources can be more effectively directed towards surveying and characterizing habitats, assessing the impact of natural processes or human activities on specific resources, and long-term monitoring. Further details about research activities in MBNMS are provided at the SIMoN website: www.mbnms-simon.org.

In addition to the Sanctuary itself, the Davidson Seamount area represents a unique ecosystem, which is of great interest to the research community (see Section 3.3, Biological Resources). Research activities related to the seamount include the following programs:

- Since the seamount was first mapped in 1933, there have been ongoing NOAA charting efforts.
- Rock samples were dredged by the US Geological Survey in 1978 and 1979.
- The Naval Postgraduate School placed scientific instruments on the seamount through the 1990s to measure currents between this offshore location and the coast.
- In 1998, the Monterey Bay Aquarium Research Institute (MBARI) completed detailed side scan and multibeam surveys to map the shape and structure of the seamount precisely.
- In 2000, MBARI led a remotely operated vehicle survey of the seamount's geology, making biological observations at the sea surface, in the midwater, and on the seamount itself.
- The Sanctuary arranged an airplane survey with NOAA Fisheries in 2001 to begin a more detailed characterization of the region's mammals.
- In 2002, the Sanctuary led another ROV expedition to explore the seamount at all depths, with the primary purpose of characterizing patterns of species distribution and abundance.
- In 2006, another expedition to study the corals of the seamount was conducted through a collaboration of the Monterey Bay National Marine Sanctuary, the Monterey Bay Aquarium Research Institute, Moss Landing Marine Laboratories, the British Broadcasting Corporation, and NOAA's Office of Ocean Exploration.

Education activities and programs in MBNMS include public events, interpretive signs and displays at parks and beaches, volunteer programs, water quality/urban runoff information, teacher workshops, shipboard and submersible "teacher-in-the-sea" opportunities, and intertidal monitoring programs for students.

3.12.2 Regulatory Environment

Goals, objectives, and action plans for research and education activities in the sanctuaries are addressed in the Sanctuary Management Plans. Some research activities are regulated by the NMSA and by Sanctuary

regulations. Some research activities, such as collecting certain wildlife (e.g., marine mammals) for study purposes, require a permit from the sanctuary. Scientific collecting permits for marine fishes, invertebrates and plants are also required by CDFG.

3.12.3 Significance Criteria and Impact Methodology

Criteria used to determine the significance of impacts on research and education resources are based on federal, state, and local standards and regulations. Impacts are considered to be significant if one or more of the proposed actions were to disrupt or interfere with the following activities:

- Interpretative programs that aim to enhance public awareness, access, and understanding of the significance of the sanctuaries and the need to protect their resources;
- Community involvement, partnerships, and program development (training programs, workshops, special events, school programs);
- Educational product development (printed materials, Web site development, audio visual materials, signs, displays, and exhibits) as critical education and outreach tools;
- Educational leadership in marine conservation and protection efforts;
- Programs that promote the sanctuaries' identity with site-specific application and products;
- Programs to establish standards of excellence to be upheld by all 13 NMS sites; and
- Scientific research on, and long-term monitoring of, the resources of the Sanctuary.

The methodology used to assess impacts involved reviewing and evaluating each proposed and alternative action to identify the action's potential to interfere with or pre-empt existing and proposed research and education programs.

3.12.4 Cross-Cutting Regulations – Environmental Consequences

The cross-cutting regulations identified in Table 2-1 include almost identical changes to the regulations in all of the three sanctuaries.

The Proposed Action

Introduced Species

The proposed regulation would prohibit the introduction of nonnative species into the three sanctuaries. Invasive species have the potential to alter ecosystem composition and function, and their introduction can indirectly impact water quality. Prohibiting the introduction of nonnative species to the sanctuaries would protect native species, habitats and ecosystem function, which would provide future beneficial impacts on research and education. Research activities concerning non-native species, such as in mariculture, would continue to occur but may require a sanctuary permit.

Discharge Regulation Clarifications

Each of the proposed new and modified regulations under the Proposed Action would provide greater protection of the sanctuaries' waters from the harmful effects of vessel pollution (oil and gas), which in turn would provide increased protection for sanctuary living resources. Although research vessels would be subject to these same discharge regulations, the overall effect would be considered beneficial for future

research and education programs. Alternate disposal options for discharges, other than within the sanctuaries, are feasible and affordable and would not prevent research vessels from operating within the sanctuaries.

Discharge — Sewage, Marine Sanitation Devices and Graywater

Requiring large vessels (300 gross tons or more) to hold sewage while in the sanctuaries and clarifying the existing regulations regarding MSDs may increase compliance and enforceability and reduce unintentional violations relating to the use of marine sanitation devices in the sanctuaries. This may result in a decrease in the discharge of raw sewage from vessels, which may benefit marine water quality. Beneficial water quality effects would increase protection of sanctuary living resources and maintain the ecosystems that are the subject of many research and education activities. Although research and education vessels would be subject to these same regulations, the proposed regulations would not prevent research and education activities from taking place in the sanctuaries.

Cruise Ship Discharges and Definitions

This proposed regulation would reduce potential harmful discharges from cruise ships including sewage, graywater, blackwater, oily bilge water, and ballast water, which degrade water quality and can impair, injure or even kill marine wildlife. Maintaining and improving water quality in the sanctuaries would provide beneficial effects for biological resources and associated research and education activities.

Alternative Regulatory Actions

Cruise Ship Prohibition Alternative

This alternative provision would result in cruise ships being allowed to discharge wastewater that has been properly treated to a level not to exceed the standards set forth by the US Coast Guard in Alaska at 33 CFR 159, Subpart E (see discussion about cruise ship wastewater discharges in Section 3.5, Water Quality). Because the wastewater would be treated to reduce nutrients (nitrogen and phosphorus) and reduce or eliminate the toxicity or hazardous properties of the wastes, the overall water quality would be improved and therefore have beneficial impacts on biological resources. This would in turn have beneficial impacts on research and education activities. Although the discharged wastewater would be treated, there is still the potential for the discharges to contain harmful effluent (i.e., oily wastes, toxic chemicals, nutrients, pathogens, viruses) that can impair, injure or even cause death to living resources. As discussed in Section 3.5.4, some MSDs do not achieve the effluent standards they are designed to meet. Therefore, the beneficial nature of the impact would be slightly less than under the Proposed Action because no discharge (treated or untreated) would be allowed under the Proposed Action.

The No Action Alternative

The No Action alternative would be to continue to manage the sanctuaries as they are currently managed. This would result in no impact on research and education within the sanctuaries.

3.12.5 Cordell Bank National Marine Sanctuary – Environmental Consequences

The Proposed Action

Seabed Protection

The proposed regulation would prohibit drilling, dredging, or altering, constructing, placing, or abandoning any structure material or matter on the submerged lands within the line representing the 50-fathom isobath surrounding Cordell Bank. Additionally, the regulation would prohibit the same activities listed above in the remainder of the sanctuary outside the 50-fathom isobath, with the exception of anchoring. Future research activities that may involve activities that would disturb the seabed would now be prohibited. However, researchers would be eligible to apply for a research permit from the Sanctuary to conduct such activities, so there remains a mechanism to allow research in the area. Furthermore, the proposed regulations would provide additional protection for Cordell Bank biological resources, which in turn would be beneficial for future research and education activities. Therefore, no adverse impacts on research and education are anticipated.

Benthic Habitat Protection

There is an existing benthic habitat regulation that prohibits the removal, taking, or injuring benthic invertebrates or algae on or within the 50-fathom isobath surrounding Cordell Bank, except for "accidental removal, injury, or takings during normal fishing operations." The proposed regulatory clarifications to this regulation will have the same amount of protection as the existing regulation and would result in negligible impacts on research and education. Existing and future research activities that may involve activities that would remove, take or injure benthic invertebrates or algae would remain prohibited. However, researchers would remain eligible to apply for a research permit from the Sanctuary to conduct such activities, so there remains a mechanism to allow research in the area.

Alternative Regulatory Actions

Seabed Protection Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within a line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action. Under this alternative, NOAA would issue regulations under the authority of the NMSA prohibiting bottom-contact fishing gear within the 50-fathom isobath surrounding the Bank. Lawful use of fishing gear other than bottom-contact gear would be exempt from the regulation. Similar to the Proposed Action, this regulation would also prohibit drilling, dredging, or altering, constructing, placing, or abandoning any structure material or matter on Cordell Bank. Existing and future research activities that may involve activities that would remove, take, or injure benthic invertebrates or algae would remain prohibited. However, researchers would remain eligible to apply for a research permit from the Sanctuary to conduct such activities, so there remains a mechanism to allow research in the area. Therefore, the impacts of this regulation to research and education are the same as the Proposed Action and would result in negligible impacts on research and education.

Benthic Habitat Protection Alternative

This alternative would be implemented if NOAA Fisheries did not impose restrictions on bottom-contact fishing gear on or within the line representing the 50-fathom isobath surrounding Cordell Bank, as expected under the Proposed Action. Under this alternative, in addition to the minor corrections and clarifications,

NOAA would issue regulations under the authority of the NMSA prohibiting bottom-contact fishing gear within the 50-fathom isobath around the Bank. As is the case with the Proposed Action, existing and future research activities that may involve activities that would remove, take or injure benthic invertebrates or algae would remain prohibited. However, researchers would remain eligible to apply for a research permit from the Sanctuary to conduct such activities, so there remains a mechanism to allow research in the area. Therefore, the clarifications to this regulation will have the same amount of protection as the Proposed Action and would result in negligible impacts on research and education.

3.12.6 Gulf of the Farallones National Marine Sanctuary – Environmental Consequences

The Proposed Action

Deserted Vessels

The proposed regulation would prohibit vessels from being deserted, either aground, at anchor, or adrift in the Sanctuary and would require vessel owners to remove harmful matter from deserted vessels. This would prevent future impacts on water quality, biological resources, and the seabed from vessel strandings and related spill incidents that could discharge harmful materials such as oil, gas and marine debris (fishing gear, pieces of a broken up boat, etc.). This regulation would have potential beneficial future impacts on water quality in the sanctuaries. Beneficial effects on water quality would have the potential to improve ecosystem protection and benefit research and education activities.

Seagrass Anchoring Prohibition

Research and education vessels would be prohibited from anchoring in designated seagrass protection zones in Tomales Bay. However, persons needing to anchor in these zones to conduct their research or education activities could apply for a research or education permit. At this time, there are no known research or education programs requiring anchoring within seagrass beds. In addition, there are areas adjacent to seagrass beds where vessels could safely anchor, so this regulation would not likely impact their activities. Therefore, this proposed prohibition would result in no impact on research and education.

Water Quality – Discharges From Outside the Sanctuary

The proposed regulation would prohibit discharging or depositing any material or other matter from beyond the boundary of the Sanctuary that subsequently enters the Sanctuary and injures a Sanctuary resource. Potential future beneficial impacts on the water quality of the Sanctuary would aid in the protection of biological resources and would potentially enhance research and education activities.

White Shark Attraction and Approaching

The Proposed Action would prohibit white shark attraction activities throughout the Sanctuary and prohibit white shark-approaching activities from within 164 feet (50 meters) of any white shark within 2 nm (2.3 miles; 3.7 km) of the Farallon Islands (where the white sharks are most prevalent during feeding). Noninvasive shark education and research would continue to be allowed within the 2 nm (2.3 miles; 3.7 km) boundary around the islands, and approaching would continue to be allowed elsewhere in the Sanctuary.

Although the regulation may restrict some types of invasive research and education activities (such as directly approaching or attracting the sharks), the regulation would not prevent research and education activities from taking place. Researchers and educators would be allowed to observe natural white shark feeding behavior throughout the entire Sanctuary. Furthermore, some shark approach activities that have a legitimate research

or education value (e.g., educational filming or white shark behavior studies) could be allowed through the issuance of a sanctuary permit. Therefore, this prohibition would result in no significant impact on research and education activities.

Alternative Regulatory Actions

The alternatives would have the same impacts as identified in the Proposed Action.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on research and education within the sanctuaries.

3.12.7 Monterey Bay National Marine Sanctuary – Environmental Consequences

The Proposed Action

Davidson Seamount

The NMSP proposed to include the Davidson Seamount within MBNMS. In addition, the proposed regulation would protect Davidson Seamount from future disturbance or from resource exploitation. The standard MBNMS discharge regulations and seabed disturbance regulations relating to drilling, dredging, seabed alterations, construction, and anchoring would apply to the DSMZ (with certain exceptions). At depths greater than 3,000 feet below the sea surface, the NMSP would prohibit moving, removing, taking, collecting, harvesting, disturbing, breaking, cutting, or other wise injuring Sanctuary resources (or attempting to do those activities), except for fishing, which is prohibited pursuant to the MSA. The Sanctuary would also prohibit the possession of Sanctuary resources taken from below 3,000 feet within the DSMZ, except for the possession of fish resulting from fishing, which is prohibited pursuant to the MSA. The NMSP would rely upon the NOAA Fisheries regulatory amendments to the Groundfish FMP to regulate any fishing-related impacts below 3000 feet. These protections to Davidson Seamount would have the potential to slightly change the way research is conducted in the area, but it would not preclude or prohibit research and educational activities. Research activities requiring the take of species beyond the 3,000 feet water depth would be allowed, subject to issuance of a permit from the Sanctuary. Overall, beneficial effects would result from including the Davidson Seamount in MBNMS, as further protection of fragile ecosystems would be provided through Sanctuary regulations. By protecting these resources, future research and educational programs could be enhanced.

Deserted Vessels

As described in GFNMS, the proposed regulation would prohibit vessels from being deserted in the Sanctuary and would prohibit leaving harmful matter (hazardous materials or wastes) aboard a deserted vessel. This would reduce the potential threat of potentially harmful discharges of oil and gas or marine debris in Sanctuary water. Since this regulation minimizes potential threats to sanctuary resources, it would have the same potential beneficial impacts on research and education activities in the Sanctuary as described above for GFNMS.

Motorized Personal Watercraft

This Proposed Action would reduce the number of MPWC used in the Sanctuary and would provide further protection of water quality and biological resources. To the extent that MPWC use has interfered or

conflicted with research and education activities, this conflict would be eliminated. Overall, this action would result in a beneficial effect for research and education.

Dredge Disposal

The proposed regulation modifications would have the potential to improve water quality in the surf zone in the Moss Landing area and have an overall minor beneficial future impact on water quality in the Sanctuary. Improved water quality may benefit research and education activities planned for the area. However, this beneficial effect is negligible.

Alternative Regulatory Actions

Motorized Personal Watercraft Alternative

The alternative action would eliminate the four designated MPWC-permitted use zones, thereby eliminating use of MPWCs in the entire Sanctuary. Compared to the Proposed Action, a slightly greater potential beneficial impact on research and education would occur due to additional protection of marine water quality and biological resources and less potential for conflicts with research and education.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on research and education within the sanctuaries.

3.12.8 Cumulative Impacts

The ROI for cumulative impacts is the same as the ROI described above. Implementation of the FMPs will contribute to a better understanding of the ROI's regional ecosystem health and provide new research and education opportunities by applying the various protective action plans in CBNMS, GFNMS, and MBNMS. Cross-cutting action plans such as Community Outreach and Maritime Heritage will serve to educate the community and ensure that research continues within the Sanctuaries. Education and Outreach action plans specific to CBNMS and GFNMS as well as the Fishing Related Education and Research, Interpretive Facilities, and Multicultural Education action plans at MBNMS will have similar to effects. There are also many action plans specific to each sanctuary that would provide opportunities for researchers to study the sanctuary's resources and share their results with the scientific community and general public.

The Proposed Action

The proposed actions will not contribute to any cumulative adverse trends; therefore, there will be no cumulative adverse impacts. There would be cumulative beneficial impacts since several of the proposed actions are expected to have positive individual effects on research and education.

Alternative Regulatory Actions

Cumulative impacts would be the same as those described under the Proposed Action, with an increase in the level of beneficial impacts due to the increased levels of protection afforded by this alternative.

The No Action Alternative

The No Action alternative would be to continue to manage the sanctuaries as they are currently managed. This would result in no cumulative impact on research and education within the sanctuaries.

3.13 SOCIOECONOMIC, DEMOGRAPHIC, AND ENVIRONMENTAL JUSTICE RESOURCES

This section discusses the socioeconomic resources of the ROI. Marin, Monterey, San Francisco, San Luis Obispo, San Mateo, Santa Cruz, and Sonoma counties were identified as the ROI for socioeconomic analysis, since potential effects on the economy would occur within this coastal region. Data for the state of California are presented for comparison and to analyze the possible broader effects of the proposed actions.

This section also discusses business uses of the sanctuaries that may potentially be impacted. Such businesses include tourist/recreational uses (e.g., whale watching, kayaking, scuba diving), and commercial uses (e.g., kelp harvesting). Depending on their relative importance to local economies, "these uses will have ripple or multiplier effects as measured by market economic values (e.g., output/sales, income, employment, and tax revenues)" and nonmarket economic values (e.g., consumer's surplus and economic rents) (Ehler, Leeworthy and Wiley 2003). This section discusses the significance and potential market effects of impacts on direct uses of the sanctuaries. Please note that impacts on commercial fishing and mariculture are addressed separately in Section 3.6 and impacts on the non-economic aspects of recreation are addressed in Section 3.11.

3.13.1 Regional Overview of Affected Environment

Definition

The socioeconomic and demographic indicators used for this study include regional economic activity (employment and business sales volume), population, employment, income, earnings, housing, and the protection of children. The ROI includes nearby trade and service centers related both directly and indirectly to the economic activities of each sanctuary. The population data include the number of residents in the area and recent changes in population growth. Data on employment, labor force, unemployment trends, income, and industrial earnings describe the economic health of a region. Income information is provided as an annual total by county and per capita.

Population

Table 3-11 presents population figures for counties of the planning area and California from 1990 to 2000. Between 1990 and 2000, the population of Sonoma County increased by 15.3 percent, which is greater than the state's growth rate of 13.6 percent. During the same time period, the populations of San Luis Obispo

Table 3-11
County Population Estimates 1990-2000

County	1990	2000	1990-2000 Change	1990-2000 Percent Change
Marin	230,096	247,289	17,193	7.0%
Monterey	355,660	401,762	46,102	11.5%
San Francisco	723,959	776,733	52,774	6.8%
San Luis Obispo	217,162	246,681	29,519	12.0%
San Mateo	649,623	707,161	57,538	8.1%
Santa Cruz	229,734	255,602	25,868	10.1%
Sonoma	388,222	458,614	70,392	15.3%
JMPR Planning Area	2,794,456	3,093,842	299,386	9.7%
California	29,760,021	33,871,648	4,111,627	13.6%

Source: US Census Bureau 2004.

(12.0 percent), Monterey (11.5 percent), and Santa Cruz (10.1 percent) increased at a rate over 10 percent, followed by San Mateo (8.1 percent), San Francisco (6.8 percent), and Marin (7.0 percent) counties. The densest population per square mile exists in San Francisco County; within the coastal JMPR planning area, other dense populations are located in Santa Cruz and the Monterey Peninsula area. The two counties within the JMPR planning area having the largest populations are San Francisco (776,733) and San Mateo (707,167). Together, these counties account for almost half (48.0 percent) of the JMPR planning area population.

Employment

In 2000, the total labor force for the JMPR planning area was approximately 1,628,460 people, of which 1,550,581 were employed. Of the seven counties in the planning area, San Francisco, San Mateo, and Sonoma counties had the largest labor forces, with 448,432, 373,831, and 239,445 people, respectively. With the exception of Marin County (1.9 percent), these same counties also had the lowest unemployment rates of 3.0 percent, 2.2 percent, and 2.8 percent, respectively. Of all the counties, Monterey County had the highest unemployment rate of 5.8 percent. In 2000, all counties' unemployment rates were considerably below the state's unemployment rate of 7.0 percent, with the JMPR planning area's unemployment rate of 3.2 being less than one-half that of the state.

Table 3-12 provides a breakdown of 1990 and 2000 employment by employment category in all seven counties of the planning area. The major economic sectors within the counties of the JMPR planning area are the services and trade sectors. The next category with the largest number of jobs is the finance/insurance/real estate sector, followed by the government, manufacturing, transportation/public utilities, construction, and farming sectors, and then the agriculture/forestry/fishing and mining sectors. Since 1990, the JMPR planning area has experienced the most growth in employment in the finance/insurance/real estate sector (29.8 percent) and the least growth in the mining sector (-23.2 percent).

Recreation and Tourism

Table 3-13 provides a breakdown of the types of travel expenses spent by travelers within the counties of the planning area in 2000. According to the Dean Runyan Associates 2002 study *California Travel Impacts by County, 1992-2000*, total travel spending in the JMPR planning area was estimated to be $16 billion dollars. This accounts for roughly 22 percent of the $75.4 billion dollars contributed to the state's economy by Californian travelers.

As shown in Table 3-13, close to $2.2 billion dollars were estimated to be spent on recreation-related travel spending in the JMPR in 2000. This accounts for approximately 14 percent of total travel spending in the JMPR planning area, and it accounts for roughly 3 percent of the $75.4 billion dollars contributed to the state's economy by travelers to California. Of the seven counties in the JMPR planning area, San Francisco County's travel spending ($8.5 billion) constitutes nearly one-half of travel spending in both total travel spending and recreation-related travel spending in 2000.

Spending on recreation-related travel activities in 2000 was estimated to be approximately $2.2 billion. Of the counties within the planning area, San Francisco ($1 billion), San Mateo ($355 million), and Monterey ($300 million) were the counties most responsible for driving recreation-related spending in the JMPR planning area, while Santa Cruz County ($79 million) was the least. In 2000, total employment estimated to be generated by recreation-related travel in the JMPR planning area was estimated to be 36,050. As with recreation-related travel spending, the same counties of San Francisco (14,500), San Mateo (4,590) and Monterey (4,590) drove recreation-related employment.

Table 3-12
County Employment by Industry Sectors (2000)

Industry Sector (Percent Change)	Marin	Monterey	San Francisco	San Luis Obispo	San Mateo	Santa Cruz	Sonoma	JMPR Planning Area
Farm								
1990**	-	-	-	-	-	-	-	-
2000	843	18,710	-	5,050	3,449	8,949	9,475	46,526
Agriculture/Forestry/ Fishing (-20.2%)								
1990	2,406	20,682	2,328	5,686	5,934	7,099	8,202	52,337
2000	(D)	26,197	2,990	5,177	(D)	2,995	6,167	43,526
Mining (-23.2%)								
1990	184	211	562	423	370	122	415	2,287
2000	(D)	281	587	323	(D)	132	533	1,856
Construction (22.3%)								
1990	8,289	8,633	16,620	8,853	20,978	9,220	17,422	90,015
2000	12,179	9,967	26,111	10,325	27,773	8,878	20,665	115,898
Manufacturing (-12.8%)								
1990	9,524	12,314	35,748	7,879	44,089	18,946	24,364	152,864
2000	5,646	11,062	32,222	1,287	39,328	11,908	34,060	135,513
Transportation/Public Utilities (10.8%)								
1990	7,746	7,369	31,418	6,510	37,885	5,549	12,386	108,863
2000	4,437	6,182	43,684	8,838	46,863	3,813	8,269	122,086
Trade (27.7%)								
1990	24,339	31,526	80,990	22,405	76,300	25,090	42,202	302,852
2000	35,467	41,448	131,493	31,245	94,508	32,164	52,694	419,019
Finance/Insurance/ Real Estate (28.8%)								
1990	16,193	8,589	41,617	5,443	33,839	6,612	16,370	128,663
2000	23,498	14,996	103,642	12,519	49,874	11,247	23,514	239,290
Services (46.2%)								
1990	57,205	57,561	177,247	40,218	133,569	45,266	71,935	583,001
2000	77,433	60,034	335,359	41,096	206,770	50,902	86,505	819,305
Government (6.9%)								
1990	14,172	26,282	55,153	20,006	41,899	17,735	27,939	203,186
2000	14,410	34,895	97,591	20,649	31,770	18,570	29,711	218,321

Source: US Census Bureau 2004; Bureau of Economic Analysis (BEA) 2004.
*(D) Not shown to avoid disclosure of confidential information.
** Farming was not considered as a separate industry sector from Agriculture/ Forestry/ Fishing in 1990.

Table 3-13
Total Recreation Travel Spending by County (1992-2000) ($ Millions)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	Percent Average Annual Change
Marin	49	55	58	61	67	73	78	86	92	8.3
Monterey	186	193	199	212	236	254	266	295	300	6.2
San Francisco	536	566	602	649	730	813	872	992	1,003	8.2
San Luis Obispo	100	105	101	102	112	119	127	136	147	5.0
San Mateo	206	213	228	250	278	310	330	346	355	7.1
Santa Cruz	50	52	52	55	60	66	69	78	79	6.0
Sonoma	119	123	127	134	145	158	170	181	188	5.9
JMPR Planning Area	1,246	1,307	1,367	1,463	1,628	1,793	1,912	2,114	2,164	6.7
California	7,400	7,600	7,900	8,300	9,100	10,000	10,700	11,500	12,100	6.4

Source: The California Travel and Tourism Commission 2000; Dean Runyan Associates 2002.

In 2000, the total earnings generated by travel spending in the JMPR planning area were estimated to be $5.5 billion. This accounts for over one-fifth (22 percent) of total earnings generated by travel spending in the state of California ($24.9 billion) that same year. Again, San Francisco ($2.1 billion), San Mateo ($1.7 billion), and Monterey ($377 million) counties accounted for approximately 82 percent of total earnings generated by travel spending in the JMPR planning area.

In 2000, total tax revenues generated from travel spending in the JMPR planning area were $973 million. Of this $973 million, $535 million were state taxes, which include state gasoline fuel tax, corporate income taxes, and personal income taxes. Property taxes and business license taxes are not included. Local taxes in the region were estimated to be $438 million. This includes sales and use taxes, and transient occupancy taxes collected by the cities and counties (Ehler, Leeworthy and Wiley 2003).

Marine-related Recreation Business

As described in Section 3.11, Recreation, the three JMPR sanctuaries offer a variety of recreational opportunities, some of which are supported by coastal businesses (e.g., tour operators, fishing supplies, and dive shops). The central coast of California is one of the most popular surfing areas in the world, serving as home to roughly 45 percent of the nation's 1.6 million surfers. Surfing-related expenditures by resident surfers and surfers who travel to over 50 spots along the central coast are a considerable component of local economies. One major surf shop operator's three regional stores alone generate $2 million annually from surf product sales; and annual surf events, such as tournaments, generate up to $2 million dollars annually (Weinstein 1996).

Popular tourist marine-related activities include pelagic birding excursions, such as those organized by Oceanic Society Expeditions, the Whale Center, and other environmental education groups, as well as sanctuary nature cruises, whale-watching trips, and shark-diving excursions.

Marine Recreational Fishing Business

Approximately 440,000 saltwater anglers, mostly California residents, fished in Pacific Ocean waters off the coast of Northern California over 2.2 million use days in 2000 (Ehler, Leeworthy and Wiley 2003). Most of

the 438,000 residents preferred fishing by use of private/rental boats or from the shore; most nonresident anglers preferred fishing by use of party/charter boats.

Expenditures by saltwater anglers provide substantial benefits throughout the Northern California region. As shown in Table 3-14, boat expenditures account for a significant portion of anglers' expenditures. A significant amount of monetary benefits to local economies are also generated in the form of sales, income, and employment from fishing-related expenditures at sporting goods stores, bait and tackle shops, marinas, and restaurants. This further creates a ripple effect to regional economies, as it transcends into the creation of income and jobs in manufacturing, transportation, and service sectors (NMFS 2001).

Table 3-14
Total Northern California Recreation/Fishing-related Expenditures by Mode and Resident Status ($000s)

	Party/Charter		Private/Rental		Shore	
	Residents	Non-Residents	Residents	Non-Residents	Residents	Non-Residents
Trip Expenditures						
Private Transportation	$4,055	$2,839	$13,044	$1,989	$16,879	$1,455
Food	$3,269	$902	$8,634	$724	$11,866	$644
Lodging	$1,701	$1,776	$3,525	$316	$9,033	$669
Public Transportation	$363	$4,533	$122	$92	$698	$812
Boat Fuel			$9,358	$370		
Party/Charter Fees	$11,126	$2,036				
Access/Boat Launching	$166	$49	$1,176	$93	$877	$3
Equipment Rental	$1,017	$740	$646	$43	$1,327	$101
Bait & Ice	$515	$48	$5,816	$158	$3,548	$137
Total Trip Expenditures	$22,212	$12,923	$12,321	$3,885	$44,228	$3,821

Source: NMFS 2001.

In 2000, the total average expenditure per person per day among Northern California anglers was approximately $1,588 (NMFS 2001). In total, Northern California saltwater anglers in 2000 spent approximately $761 million, of which resident anglers spent approximately $740 million.

White Shark Diving

There are currently two known commercial operations that offer seasonal cage diving expeditions to view white sharks in GFNMS and at least one group that conducts opportunistic diving but does not operate a commercial venture. In years past, as many as eight white shark diving operations have operated at the Farallones. Currently no commercial operation derives all of its income from shark diving operations at GFNMS since the actual shark season is so short and unpredictable. Shark diving within GFNMS is estimated to comprise approximately 30 percent of one of the annual revenue for one company (Great White Adventures), and less than one percent for the other company (Incredible Adventures) (NOAA 2005c).

Protection of Children from Environmental Health or Safety Risks

In April 1997, President Clinton signed Executive Order (EO) 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. This EO requires federal agencies to identify, assess, and address disproportionate environmental health and safety risks to children from federal actions.

Environmental Justice

On February 11, 1994, President Clinton signed EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*. The purpose of this order is to require federal agencies to identify and avoid disproportionate impacts on minority or low-income communities. This section identifies any minority or low-income communities that could be affected by the proposed project.

Table 3-15 provides 2000 demographic information for the counties in the planning area. According to the 2000 census, the populations of each county in the planning area, as well as that of the JMPR planning area as a whole, are close to or greater than 50 percent Caucasian and less than 10 percent black/African American. Regionally, the planning area's northern counties of Sonoma and Marin are predominantly white, while the southern counties of Santa Cruz, Monterey, and San Luis Obispo have large Hispanic/Latino populations. The Asian population is greatest in San Francisco and San Mateo counties (30.8 percent and 20.0 percent, respectively). In 2000, the Latino population was highest in Monterey County (46.8 percent) and was the largest ethnic group overall, accounting for 22.0 percent of total JMPR planning area population.

Table 3-15
Total Percentage of Population by Race/Ethnicity (2000)

County	One Race	White	Black, African American	Native American, Alaska Native	Asian	Native Hawaiian, Pacific Islander	Some Other Race	Two or More Races	Latino, Hispanic, Any Race
Marin	96.5 %	84.0 %	2.9 %	0.4 %	4.5 %	0.2 %	4.5 %	3.5 %	11.1 %
Monterey	95.0 %	55.9 %	3.7 %	1.0 %	6.0 %	0.4 %	27.8 %	5.0 %	46.8 %
San Francisco	95.7 %	49.7 %	7.8 %	0.4 %	30.8 %	0.5 %	6.5 %	4.3 %	14.1 %
San Luis Obispo	96.6 %	84.6 %	2.0 %	0.9 %	2.7 %	0.1 %	6.2 %	3.4 %	16.3 %
San Mateo	95.0 %	59.5 %	3.5 %	0.4 %	20.0 %	1.3 %	10.2 %	5.0 %	21.9 %
Santa Cruz	95.6 %	75.1 %	1.0 %	1.0 %	3.4 %	0.1 %	15.0 %	4.4 %	26.8 %
Sonoma	95.9 %	81.6 %	1.4 %	1.2 %	3.1 %	0.2 %	8.4 %	4.1 %	17.3 %
JMPR Planning Area	96.7 %	70.1 %	3.2 %	0.8 %	10.1 %	0.3 %	11.2 %	4.2 %	22.0 %
California	95.3%	59.5%	6.7%	1.0%	10.9%	0.3%	16.8%	4.7%	32.4%

Source: US Census Bureau 2004.

Note: In combination with other races. The categorical figures/percentages may add up to more than the total population (100 percent) because individuals may report more than one race.

Note: Percentages for a given year may not add to 100 because "Hispanic" is an ethnicity category, which includes all races and because people can select from more than one race.

Table 3-16 provides income and poverty statistics for all counties in the planning area and in California in 2000. Marin, San Mateo, and San Francisco counties had the highest per capita personal incomes of $60,618, $58,644, and $55,272, respectively. The average per capita personal income for the JMPR planning area was approximately $43,370, an average increase of 40.5 percent over its 1990 value and remaining considerably higher than the state average of $32,149 (US Census Bureau 2004).

Table 3-16
Income and Poverty Statistics (2000)

County	Median Household Income ($)	Per Capita Income ($)	Per Capita Personal Income ($)	Percentage of Population Living in Poverty (2000)	Percentage of Population Living in Poverty (1990)
Marin	71,306	44,962	$60,618	6.6 %	5.2 %
Monterey	48,305	20,165	$29,695	13.5 %	11.6 %
San Francisco	55,221	34,556	$55,272	11.3 %	12.7 %
San Luis Obispo	42,428	21,864	$26,932	12.8 %	13.0 %
San Mateo	70,819	36,045	$58,644	5.8 %	6.3 %
Santa Cruz	53,998	26,396	$37,567	11.9 %	10.7 %
Sonoma	53,076	25,724	$34,863	8.1 %	7.6 %
JMPR Planning Area	56,450	29,959	$43,370	10.0 %	9.6 %
California	47,493	22,711	$32,149	14.2 %	12.5 %

Source: US Census Bureau 2004; Economic Research Service 2004; BEA 2004; Ehler, Leeworthy and Wiley 2003.
Note: Figures calculated without taking into account the inflation rate.

As with personal per capita income values, Marin, San Mateo, and San Francisco counties had both the highest per capita incomes of $44,962, $36,045, $34,556, respectively, and the highest median household incomes of $71,306, $70,819, and $55,221, respectively. San Luis Obispo County had the lowest median and per capita incomes of the seven counties, at $42,428 and $21,864, respectively. The JMPR planning area's median and per capita income was significantly above the California average. In 2000, 14.2 percent of the population was below the poverty level in California, and 10.0 percent, approximately 279,445 people, were below the poverty level in JMPR planning area (US Census Bureau 2004).

3.13.2 Significance Criteria and Impact Methodology

Criteria to determine the significance of impacts associated with socioeconomic, demographic, and environmental justice issues are based on federal, state, and local standards and regulations. Impacts are considered to be significant if the Proposed Action were to result in:

- Substantial changes in unemployment rate;
- Substantial changes in total income;
- Substantial changes in business volume;
- Changes in the local housing market and vacancy rates, particularly with respect to the availability of affordable housing;
- Conflicts with the objectives, policies, or guidance of federal, state, and local plans;
- Disproportionately high and adverse human health or environmental effects on minority or low-income populations; or
- Violations of NOAA Regulations.

Socioeconomic, demographic, and environmental justice data in and around the sanctuary boundaries were examined to determine these resources' sensitivity to proposed action impacts. Also considered was the consistency of the proposed regulatory changes with the objectives and policies of state and county land use and development plans.

The overall methodology, including data sources and assumptions, used to conduct the socioeconomics, demographics, and environmental justice impact evaluation is consistent with the NOAA NEPA guidelines (NAO 216-6).

No impacts on environmental justice are expected under the No Action alternative, and beneficial impacts on environmental justice are expected under the Proposed Action and the alternatives. The Proposed Action and alternatives are expected to improve the quality of life, resulting in long-term beneficial impacts on local residents (including low-income and minority populations), as well as on the health and safety of children. Therefore, impacts on environmental justice are not discussed further in this analysis.

3.13.3 Cross-Cutting Regulations – Environmental Consequences

The Proposed Action

Introduced Species

Reducing the number of introduced species in the sanctuaries could potentially benefit recreation and economic industries. Industries, such as water and power utilities, commercial and recreational fishing could benefit from a reduction in yearly expenditures on preventing the interference of introduced species on operations. Limiting the spread and influence of introduced species also would reduce the competition between introduced and native species, which could increase the numbers of native species available for catch and thus have limited beneficial impacts to recreational fisheries. The regulation exempts the release of striped bass, which was introduced in California over a hundred years ago and is now managed by the state as a recreational fishery. As such, the regulation is not anticipated to negatively impact the recreational fishing industry.

Aquaculture, which is specific to Tomales Bay in GFNMS, would receive some beneficial benefits from the reduction of introduced species that could foul equipment and interfere with operations. All species cultivated by existing mariculture activities in Tomales Bay pursuant to a valid lease, permit, license or other authorization issued by the State of California and in effect on the effective date of the final regulation would be exempt from the proposed introduced species regulations and would not be affected or impacted by the regulation. Future mariculture operations that are not "grandfathered" under the pre-existing leases would be allowed to operate if they cultured native species, however, introduced species would not be allowed. At this time NOAA is not aware of any new or proposed State if California mariculture leases in Tomales Bay, therefore there are no anticipated negative impacts to the mariculture industry.

The proposed prohibition on introducing or releasing introduced species in the sanctuary could have a minor adverse affect on certain socioeconomic resources within the sanctuaries. Prohibition of introduced species and ballast discharges could affect the daily operations of specific industries such as the aquarium, mariculture or seafood industries. The prohibition would prohibit the dumping of imported or nonnative bait, chum, fish, invertebrates, or plants into the sanctuaries. Some industries, such as seafood importers, restaurants, and aquariums, import live plants or animals (usually seafood) and may inadvertently dispose unused stock or

packaging material (such as seawater or seaweed), which in-turn could result in the introduction of live nonnative species into sanctuary waters. Also, live bait operations would need to ensure they do not deposit any excess nonnative live bait into sanctuary waters. This prohibition could create a minor administrative burden on such industries by obligating them to dispose of this material safely; however the sanctuaries' public outreach and education plans would help mitigate this impact by providing guidance and information. This would not result in a significant adverse impact on socioeconomic resources in the ROI.

In summary, as described above, this regulatory change would result in a minor beneficial effect and less than significant adverse impacts on socioeconomic resources.

Discharge Regulations Clarifications

Amending discharge regulations would provide a beneficial impact on socioeconomic resources within the sanctuaries. Limiting pollutants could improve the quality and amount of current recreational, tourism-related, and commercial activities that take place within the sanctuaries. An overall improvement in water quality would result from updated discharge regulations, and prohibiting ballast, bilge, and harmful discharges would benefit recreational users by removing hazards and improving water quality. This could directly improve socioeconomic resources associated with marine recreational activities within the sanctuaries.

However, amending discharge standards and regulations could produce slight adverse socioeconomic effects on boaters within the sanctuaries. Removal of some exceptions to discharge regulations, such as meals on board and some deck washings may increase economic costs for private boaters, or owners of charter vessels used for fishing and wildlife watching. Therefore, this regulatory change would result in both beneficial and less than significant adverse impacts on socioeconomic resources.

Sewage, Marine Sanitation Devices and Graywater

For vessels 300 or more gross tons, sewage discharges/deposits would be prohibited, as the vessels would be required to hold sewage while in the sanctuaries, if they have sufficient holding capacity. The proposed regulations would provide beneficial impacts on socioeconomic resources within the sanctuaries. Stricter regulations could prevent large vessels from discharging pollutants affecting the quality of current water-related recreational, tourist, and commercial activities within the sanctuaries. The proposed regulations are not expected to result in increased costs for large vessels within the sanctuaries since they would not require the purchase of additional equipment or change labor needs.

For vessels less than 300 gross tons, the proposed regulatory language modification clarifies that vessel operators must use a Type I or Type II MSD when discharging sewage, which is what is already required by the Coast Guard. The regulation would allow vessels to have a Type III MSD, but they could not discharge untreated waste into the sanctuary and would have to either discharge this waste at a harbor pump-out facility or outside the sanctuary according to Coast Guard regulations. This regulation essentially clarifies expectations to boaters and does not add any significant burdens beyond what is already required by sanctuary or Coast Guard regulations. Therefore, no adverse socioeconomic effect on vessels is associated with the modification. The requirement to secure marine sanitation devices in a manner to prevent discharge of untreated sewage may pose a minor burden on boat owners who have not purchased a lock or clasp to ensure the effective operation of the marine sanitation device; however, the impact of this addition is negligible.

Cruise Ship Discharge and Definitions

The proposed regulations enforced on cruise ships within the sanctuaries would provide beneficial impacts on socioeconomic resources within the sanctuaries. Stricter regulations could prevent cruise ships from discharging unallowable pollutants that affect the quality of current water-related recreational, tourist, and commercial activities within the sanctuaries. The proposed regulations are not expected to result in increased costs for cruise ships within the sanctuaries since it would not require the purchase of additional equipment or change labor needs. (Impacts on cruise ship operations and economics are further discussed in Section 3.10, Marine Transportation.)

Alternative Regulatory Actions

Cruise Ship Prohibition Alternative

This provision would result in slightly greater economic impacts on the cruise ship industry than the Proposed Action. This alternative requires the industry to have functioning waste treatment facilities on-board that are able to meet the EPA and Coast Guard standards for cruise ships in Alaskan waters. The industry would also need to monitor compliance and produce reports to the sanctuary program. These would impose costs to the cruise ship industry beyond that of the Proposed Action. (Impacts on cruise ship operations and economics are further discussed in Section 3.10, Marine Transportation.)

The No Action Alternative

The No Action alternative would be to continue to manage the sanctuaries as they are currently managed. This would result in no impact on socioeconomics within the sanctuaries and surrounding areas.

3.13.4 Cordell Bank National Marine Sanctuary – Environmental Consequences

The Proposed Action

Wildlife Disturbance

Stricter regulations on the taking or possessing of protected wildlife within CBNMS could have slight beneficial impacts on socioeconomic resources within CBNMS, to the minor extent that the proposed regulation would result in a greater abundance of wildlife and a corresponding increase in tourism within the area. An increase in tourism could lead to a slight increase in local spending and a boost in revenues for local businesses, outfitters, and operations oriented toward popular recreational Sanctuary activities, such as wildlife viewing, hiking, and nature excursions. Overall, this benefit to socioeconomic resources is negligible, as there are existing regulations protecting wildlife and the proposed regulation essentially duplicates existing regulations in terms of what business must do to comply with the prohibition.

Seabed Protection

The proposed regulation would prohibit drilling, dredging, or altering, constructing, placing, or abandoning any structure material or matter on the submerged lands within the line representing the 50-fathom isobath surrounding Cordell Bank. Additionally, the regulation would prohibit the same activities listed above in the remainder of the sanctuary outside the 50-fathom isobath, with the exception of anchoring. This regulation would have the potential to reduce marine activities within the Sanctuary boundaries; however, since few to no bottom-contact activities (other than fishing) are known to occur within the affected area, this is expected to result in a negligible impact on socioeconomics, as marine-related business activity would not be affected. The proposed regulation would not apply to bottom contact gear used during fishing, which is prohibited

pursuant to 50 CFR part 660 (Fisheries off West Coast States and in the Western Pacific). (Impacts on commercial fisheries are discussed in Section 3.6, Commercial Fisheries.)

Benthic Habitat Protection

The proposed clarifications to the Cordell Bank benthic habitat regulation will have the same amount of protection as the existing regulation and would result in negligible impact on marine-related business activity and therefore negligible effects on socioeconomics.

Alternative Regulatory Actions

The alternatives would have the same negligible impacts as identified in the Proposed Action.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on socioeconomics.

3.13.5 Gulf of the Farallones National Marine Sanctuary –Environmental Consequences

The Proposed Action

Wildlife Disturbance

The impact of this regulatory change in GFNMS would be the same as described in CBNMS. This would result in a negligible beneficial impact on socioeconomics.

Deserted Vessels

Prohibiting marine vessel owners from deserting vessels and from leaving harmful matter aboard deserted vessels could indirectly have a beneficial impact on socioeconomic resources. When a vessel is deserted, there is a high risk of discharge of harmful matter (e.g., motor oil or other chemicals) into the marine environment. Although vessel owners would bear the costs of disposing of old vessels and harmful materials, which represents a minor adverse socioeconomic effect, reducing the impacts of oil spills from abandoned vessels and reducing the risks of hazards posed by abandoned vessels would have beneficial impacts on recreation users and recreational fishing operations and activities. Beneficial recreational effects could translate to slight increases in recreational business activity. Thus, the Proposed Action would result in a minor, indirect beneficial socioeconomic impact, and a minor adverse socioeconomic impact.

No-Anchoring Seagrass Protection Zones

As described in the Fisheries (section 3.06), Marine Transportation (section 3.10), and Public Access and Recreation (section 3.11) analyses, minor adverse impacts on recreational boating in general may occur as a result of the proposed prohibition on anchoring a vessel in a designated seagrass protection zones in Tomales Bay, except as necessary for mariculture operations conducted pursuant to a valid lease, permit, or license.

The proposed regulation would allow vessel operators to continue to sail, boat, fish or transit the Bay, and even anchor adjacent to marinas (since these areas are not included in the zones). Though the regulation would prohibit operators from anchoring a vessel in a designated seagrass protection zone, they could still anchor in the remaining 78% of the Sanctuary. Because this regulation does not limit actual vessel use, and provides alternatives for anchoring a vessel outside of designated zones, the adverse impacts on socioeconomics would be less than significant. In addition, the regulation would also help maintain and

protect seagrass and the other species that depend upon seagrass habitat for their own life history or foraging. Therefore, the regulation would have indirect beneficial impacts to those commercial (Pacific herring fishery) and recreational outfitters (wildlife watching, recreational fishing) that depend upon healthy seagrass beds for their own industries.

White Shark Attraction and Approaching

The proposed action would prohibit white shark attraction activities throughout the Sanctuary and prohibit white shark-approaching activities from within 164 feet (50 meters) of any white shark within 2 nm (2.3 miles; 3.7 km) of the Farallon Islands (where the white sharks are most prevalent during feeding). The proposed regulation does not prevent any user, vessel or business from conducting shark viewing activities, however, it may reduce a company's ability to predictably "attract" white sharks to their boat and offer a close encounter with the sharks. As such, this may reduce the number of people willing to pay money to see sharks if viewing them cannot be assured or "guaranteed."

Adverse impacts would be realized by certain shark-related, adventure tourism businesses, such as shark watching, cage diving, filming, and other wildlife watching business operations within the Sanctuary that use decoys and chumming to feed and attract sharks for divers and tourists. Most of this unregulated seasonal activity (September-November) in GFNMS is directed at white shark populations located between Mirounga Bay and Fisherman's Cove in the Southeast Farallon Islands (Absolute Adventures-Shark Diver 2003). As described in the Affected Environment, up to eight shark-related individual or ecotourism groups have operated at the Farallones in the past, but currently only two companies are known to conduct operations. None of these commercial operators currently derives all of its income solely from shark diving operations at GFNMS. During the white shark season in fall 2005, the commercial companies conducting white shark dive trips at the Farallon Islands planned on offering a combined total of approximately 71 full-day trips (NOAA 2005c).

This prohibition could impact the revenues of one company that generates approximately 30 percent of their annual revenue from white shark cage diving operations (NOAA 2005c). The actual impact on this company's revenues would ultimately depend upon their ability to adapt to the new regulations and alter their business plan to conduct activities that do not involve or rely upon the active attraction of white sharks in the GFNMS or actively approaching them within 2 nm of the Farallon Islands. If this cannot be done, then they would have to rely upon other diving or wildlife viewing activities in the Sanctuary or move the operation to outside the GFNMS. The other company currently operating at GFNMS is estimated to generate less than one percent of its revenues from shark diving operations in the sanctuary, and would not experience a substantial adverse impact from the proposed regulations.

The proposed regulations would result in a less than significant impact on socioeconomic resources because neither of the businesses engaged in this activity relies predominantly on white shark viewing for their income and the loss of that income would not constitute a substantial change in total income or business volume within the ROI.

The proposed regulation may also impact other non-cage diving, shark watching, filming, and research activities that approach white sharks. However, some of these activities that have bonafide research or education value, could be allowed through the issuance of a sanctuary permit. Since these activities are very sporadic, the proposed prohibition would not be expected to result in significant impacts on these users.

Oil and Gas Pipeline Clarification

The proposed change in regulations regarding the placement of oil and gas pipelines in GFNMS would have negligible socioeconomic effects. Since pipelines would be permitted only for oil and gas operations that are adjacent to the Sanctuary, rather than oil and gas operations anywhere outside of the Sanctuary, the potential for future pipeline development would be more limited. However, there are no current oil and gas operations in the area and none planned in the near future.

Alternative Regulatory Actions

White Shark Approach Prohibition Alternative

This alternative would provide a variation on the proposed regulations for approaching white sharks. Approaching would be prohibited throughout the Sanctuary rather than just within 2 nm (2.3 miles, 3.7 km) of the Farallon Islands. Like the Proposed Action, this alternative would prohibit attracting white sharks anywhere in the Sanctuary. As under the Proposed Action, this would result in a less than significant adverse impact on socioeconomics, because neither of the businesses engaged in this activity relies predominantly on white shark viewing for their income, and the loss of that income would not constitute a substantial change in total income or business volume within the ROI.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on socioeconomics within the sanctuaries and surrounding areas.

3.13.6 Monterey Bay National Marine Sanctuary–Environmental Consequences

The Proposed Action

Deserted Vessels

The impact of this regulatory change in MBNMS would be the same as in GFNMS. This would result in a minor beneficial impact on recreation-related businesses and a minor adverse impact on vessel owners, as described for GFNMS in Section 3.13.5.

Boundary Changes/Davidson Seamount

By adding Davidson Seamount to the sanctuary, the standard MBNMS disturbance regulations relating to drilling, dredging, seabed alterations, construction, and anchoring would apply, however, no exceptions would be allowed in the Davidson Seamount zone as they are in other areas of MBNMS. Therefore, no disturbance of the seabed would be allowed. In addition, at depths greater than 3,000 feet below the sea surface, the NMSP would prohibit moving, removing, taking, collecting, harvesting, disturbing, breaking, cutting, or other wise injuring Sanctuary resources (or attempting to do those activities), except for taking, catching or harvesting of fish pursuant to the MSA. The NMSP would rely upon the NOAA Fisheries regulatory amendments to the Groundfish FMP to regulate any fishing-related impacts below 3000 feet. These NOAA Fisheries amended regulations prohibit fishing with dredge gear, beam trawl, certain types of bottom trawl, and bottom contact gear or any other gear that is deployed greater than 500 fathoms (3000 feet) (71 FR 27408). Therefore fishing would take place in the water column above 3000 feet but not below it and as such existing fishing activities would not impact the seamount. The only potential socioeconomic resources associated with the Seamount that could be affected are seabed bioprospecting or mineral harvesting. The proposed prohibition could reduce potential future economic benefits that could be derived from

bioprospecting or mineral harvesting opportunities. As none of these activities actually exist or are proposed or planned to be initiated in the foreseeable future, the addition of Davidson Seamount would result in a minor less than significant impact on socioeconomic resources. (Impacts on commercial fisheries are discussed in Section 3.6.)

Motorized Personal Watercraft

Broadening the MPWC definition to include all MPWC would have both beneficial and adverse socioeconomic impacts within the MBNMS area. Minor beneficial socioeconomic impacts would result from broadening the MPWC definition since it would increase the Sanctuary's appeal to specific recreational groups, such as kayakers, paddle-in surfers, swimmers, and wildlife watchers, whose quality of enjoyment is diminished by MPWC users. Indirect beneficial impacts on local economies could be felt by local businesses whose employment and revenues depend on retail sales, manufacturing, and services oriented toward non-MPWC recreationists and tourists.

Adverse socioeconomic impacts could result from decreased harbor revenues and impacts on MPWC businesses. Although harbor revenues could be adversely impacted through the potentially reduced number of MPWC-related boat launches, this impact would be minor. No local businesses have been identified that derive revenue from MPWC rentals within MBNMS waters. Therefore, the overall impact on this socioeconomic resource would be less than significant in the ROI.

The proposed MPWC restrictions would have impacts on particular MPWC recreational user groups such as "tow-in" and "tow-at" surfers. Impacts on recreational users are discussed in Section 3.11, Public Access and Recreation.

A seasonal MPWC zone would be established to accommodate MPWC use at Mavericks, off of Pillar Point. With this seasonal zone, the annual (conditions permitting) Mavericks surf contest should be unaffected. Prize money from the 2004/2005's contest purse was $75,000 (Sanders 2004). Thousands of spectators and journalists converge at Pillar Point each year to watch the competition, contributing an estimated $25,000 to $34,000 to the local economy (Half Moon Bay Chamber of Commerce 2006). The contest itself does not allow the use of MPWC to catch waves, but practice activities for the contest, as well as photographers, observers, and safety personnel during the contest, use MPWC. Given that the contest usually occurs during the winter months in high surf conditions, the seasonal MPWC zone should be in effect. Overall, the proposed regulation would lead to a less than significant adverse impact on socioeconomic resources in the ROI.

White Shark Attraction

MBNMS regulations currently prohibit white shark attraction activities within specific areas of the Sanctuary. Excluding white shark attraction from the entire Sanctuary is unlikely to have the same socioeconomic impacts as those identified above for GFNMS, because there has been little to no documentation of commercial white shark diving in MBNMS. Socioeconomic impacts of this prohibition are therefore considered to be negligible.

Dredge Disposal—SF-12

Redefining and officially locating disposal site SF-12 would reduce the probability of accidental release of dredged material in the nearshore area of the Sanctuary. To the extent that this action would indirectly improve recreational qualities in the vicinity of the disposal site (beaches and nearby harbors and estuaries), it

may result in a minor beneficial impact on socioeconomic resources related to recreation and tourism operations. Overall, the impact is negligible.

Alternative Regulatory Actions

The alternatives would have the same impacts as identified in the Proposed Action, with the following differences.

Motorized Personal Watercraft Alternative

This alternative would eliminate all MPWC use from the entire Sanctuary. In addition to the adverse, but not significant impacts identified for the Proposed Action, there might be limited socioeconomic impacts on businesses that cater to MPWC use in the Sanctuary; however there are no commercial establishments that receive significant revenues associated with MPWC use in these zones. Therefore, the socioeconomic impacts from this alternative prohibition would be less than significant.

No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on socioeconomics within the sanctuaries and surrounding areas.

3.13.7 Cumulative Impacts

Cumulative projects, especially those that affect development onshore, would have both beneficial and adverse impacts on socioeconomic resources in the project area. Increased development activities could lead to growth in population, local economies, tourism, and in the number of trade, retail, and tourism-related services provided in the area, and as a result, employment. Conversely, growth in population and/or tourism resulting from an increase in development projects could also directly lead to a reduction in the quality of biological, recreational, and water resources upon which many socioeconomic resources depend. Increased development also could have adverse impacts on small business owners and local businessmen who could be overrun by larger businesses and companies.

However these development pressures would be restrained by ongoing planning efforts in the ROI, including the action plans contained in the FMPs, designed to preserve and protect the natural resources of the sanctuaries through identification, planning, management, and public education. Cumulative projects that might have a beneficial effect on socioeconomic resources in the project area include revised and updated county general and coastal plans, seawall and armoring projects, and the Bolinas and Big Lagoon restoration projects, as all provide for better county management and support greater protection for those resources that indirectly benefit socioeconomic resources. Updated county general plans are expected to provide a sound basis for making decisions about the amount and location of future growth; this is expected to have beneficial impacts in managing the socioeconomic resources of population, employment, and industry sector growth. Several of the ongoing or planned development projects, such as the Bolinas Lagoon Restoration project, would provide better access to open space, leading to greater use of public open spaces, recreational activities, tourism-related activities, and other local associated services.

The FMPs could further restrict the economic potential of some activities within the sanctuaries. The action plans concerning wildlife disturbance for GFNMS (Wildlife Disturbance) and MBNMS (Marine Mammal, Seabird, and Turtle Disturbance, and Tide Pool Protection) could restrict other economically viable activities that rely on interactions between humans and wildlife.

The Proposed Action

Although the Proposed Action would result in some adverse impacts on socioeconomics, these direct impacts would be less than significant and geographically limited in scope. In contrast, population growth, average income, and socioeconomic development within the ROI would continue to increase. The Proposed Action would not therefore contribute to a cumulatively adverse impact on socioeconomics. In the long term, the Proposed Action would likely support socioeconomic development by way of the increased protection for natural resources within the sanctuaries, as these resources are part of the reason why such development is successful. This would result in a beneficial contribution to cumulative socioeconomic development.

Cumulative impacts of the Proposed Action associated with projects in the ROI such as the updated county general plans habitat restoration projects would provide better access to open space, recreational activities, and other local associated services. Therefore, beneficial impacts are expected to result from cumulative projects on minority and low-income populations.

Alternative Regulatory Actions

Cumulative impacts from regulations under the Alternative Regulatory Actions would be similar to those resulting under the Proposed Action.

The No Action Alternative

The No Action alternative would not implement the proposed regulatory changes (including prohibitions on MPWCs and white shark attracting and approaching), and sanctuary management would remain status quo. There would be no contribution, either beneficial or adverse, to cumulative socioeconomic development in the ROI.

3.14 VISUAL RESOURCES

This section describes the impacts on the visual resources within the ROI. The ROI for visual resources is the area within and immediately surrounding the three sanctuaries, including the Davidson Seamount area proposed to be included in the MBNMS. The visual character of the project area is described, potentially sensitive visual receptors are identified, and policies relating to maintaining visual quality are summarized. The visual character of the project area includes a description of landforms, marine flora and fauna, and human activities. Potentially sensitive visual receptors are typically people within or immediately adjacent to the sanctuaries who would notice changes to the visual environment.

3.14.1 Regional Overview of Affected Environment

Visual resources in the ROI include ocean vistas, offshore islands, coastal landforms (e.g., rocky bluffs), coastal waves, and marine sea life. Many opportunities for nature observation exist in the sanctuaries, including whale, seabird, and marine mammal viewing. Rocky shorelines provide hikers with the opportunity to view flora and fauna associated with the rocky intertidal habitats.

The following human activities are also visible (US Department of Commerce 1989; NOAA 2001a; NOAA 2001b):

- Fishing. Commercial and sport fishing occur in the sanctuaries. A number of mariculture operations in Tomales Bay raise oysters. These topics are discussed further in Section 3.6, Commercial Fisheries, and Section 3.11, Public Access and Recreation.
- Shipping. The sanctuaries are near or within one of the nation's busiest shipping lanes. This topic is discussed further in Section 3.10, Marine Transportation.
- Military Uses. As described in Section 3.9, Land Use and Development, the USCG and US Navy use the ROI for various military training activities.
- Research and education. Research vessels operate within the ROI and are visible to sanctuary users. This topic is discussed further in Section 3.12, Research and Education.
- Recreation. The major coastal and onshore recreational uses include beach-related activities, bird watching, coastal hiking, wildlife viewing, tidepooling, surfing, kayaking, canoeing, boardsailing, clamming, abalone diving, surf fishing, and duck hunting. Whale watching, Farallon Islands wildlife viewing, and oceanic birding excursions account for several thousands of visitors venturing offshore. This topic is discussed further in Section 3.11, Public Access and Recreation.

Marine flora and fauna are also visible in and immediately adjacent to the sanctuary. These resources are described in Section 3.3, Biological Resources.

Cordell Bank National Marine Sanctuary

Visual access to CBNMS from onshore areas is limited because the eastern edge of CBNMS is 6 nm (7 miles; 11 km) from shore and is separated from the coast of Marin and Sonoma counties by the northern arm of GFNMS (NOAA 2001c).

Visitor use of CBNMS waters is limited by weather conditions and by its distance from the nearest port (US Department of Commerce 1989). Since the Sanctuary is completely offshore in open ocean waters, there are no landforms contributing to visual resources. The coastal areas of west Marin and Sonoma counties are

sparsely populated, with ranching, dairy farms, agriculture, and public open space maintaining their rural character (NOAA 2001c). Bodega Bay is an active fishing port that harbors the closest marinas to the Sanctuary. This harbor also serves as the departure point for charter vessels that provide recreational fishing and wildlife viewing opportunities in the Sanctuary. Although Bodega Bay provides the base for most of the commercial and recreational fishing, Drakes Bay at Point Reyes, 20 miles (32 km) east of Cordell Bank, is the closest anchorage.

In addition to Bodega Bay, there are several smaller communities in the vicinity, including Dillon Beach, Marshall, Inverness, and the village of Point Reyes Station (US Department of Commerce 1989).

Visual resources within CBNMS include a wide variety of seabirds and marine mammals. Wildlife viewing is an increasingly popular activity at Cordell Bank. The oceanic water borne by the California current is clean, cold, and exceptionally clear. The clarity of the water is the result of low particulate loading, which allows sunlight to penetrate much greater depths than would be normal along the nearby California coast. Visibility on the upper reaches of the Bank is almost always greater than 65 feet (19.8 meters) during the fall. At times it can be greater than 100 feet (30.5 meters).

Gulf of the Farallones National Marine Sanctuary

The Farallon Islands provide a unique natural scenic resource in the ROI. Many points in Sonoma, Marin, San Francisco, and San Mateo counties provide direct access and views of the Sanctuary (NOAA 2001b). Most of these access points are located in federal, state, county, and local parks. Access for private and chartered recreational vessels destined for the Sanctuary is found at marinas in San Francisco Bay, Bodega Harbor, Tomales Bay, and Half Moon Bay.

In addition to the Farrallon Islands, the Sanctuary's main visual resources are the several bays, points, and heads that line its coastline. The most notable of these features are Bolinas Lagoon, Drakes and Bodega Bays, Duxbury Point, Point Reyes, and Bodega Head. Key estuaries within the Sanctuary that also contribute to visual resources include Estero Americano, Estero de San Antonio, and Tomales Bay.

Monterey Bay National Marine Sanctuary

The Sanctuary's spectacular coastal scenery, accessibility, moderate climate, abundance of marine life, and relatively clean ocean waters all draw large numbers of divers, kayakers, boaters, fishermen, surfers, tidepoolers, and bird and mammal watchers. One of the main reasons given for travel to the coastal region is its natural and scenic beauty. With nearly 300 miles (500 km) of shoreline, there are many viewing opportunities of the Sanctuary and the scenic coastline that serves as its boundary. Coastal topography varies greatly, encompassing steep bluffs, pocket beaches, long stretches of sandy beaches, sand dunes, rocky cliffs and both low- and high-relief mountain ranges. The varied terrain contributes to the scenic qualities of the Sanctuary.

3.14.2 Regulatory Environment

California Coastal Act

The California Coastal Act Section 30251, Scenic and Visual Qualities, states that "the scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding

areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting."

California Scenic Highway Program

Highway 1 follows the coastline throughout the ROI (through Sonoma, Marin, San Francisco, San Mateo, Santa Cruz, Monterey, and San Luis Obispo Counties), and provides scenic views of the sanctuaries in many locations. Parts of Highway 1 are official designated as a state scenic highway (in San Mateo, Monterey, and San Luis Obispo counties), and portions of it are eligible for designation in all the other counties in the ROI (California Department of Transportation 2004). Additionally, part of Highway 1 in Monterey is also designated as an All-American road (California Department of Transportation 2004). One aspect of what makes Highway 1 eligible for this status is the location of the road, adjacent to the ocean in many places, and providing expansive views of the sanctuaries. The purpose of California's Scenic Highway Program is to preserve and protect scenic highway corridors from changes that would diminish the aesthetic value of lands adjacent to highways (California Department of Transportation 2004). While Highway 1's designation as a scenic highway does not directly affect sanctuary management activities, such designation does encourage local jurisdictions to support protection of scenic resources within the viewshed of the highway, including within sanctuary boundaries.

Sanctuary Management Plans

Current management plans in place in the three sanctuaries do not have any visual resource-specific management efforts; however ongoing sanctuary resource protection regulations and programs have the additional effect of protecting valuable visual resources that contribute to the visitor experience in the ROI. Additionally, protection of sanctuary visual resources can result in increased levels of visitor support for sanctuary resource management in other areas.

3.14.3 Significance Criteria and Impact Methodology

Factors considered in determining whether a proposed or alternative action would have a significant impact on visual resources include the extent or degree to which its implementation would result in the following:

- Introduce physical features that are substantially out of character with local surroundings;
- Alter a site so that a sensitive viewing point or vista is obstructed or adversely affected, or if the scale or degree of change appears as a substantial, obvious, or disharmonious modification of the overall view; or
- Be inconsistent with visual resource policies.

Since the proposed action involves changes in regulations rather than a physical "project," it would not result in any direct physical changes or construction of physical structures. For this proposed action, the analysis focuses on the potential for change in the amount of potential operations of activities and the frequency of operations or activities, which in turn could affect existing visual resources. The overall methodology is consistent with CEQ guidance and NOAA NEPA guidelines (NAO 216-6).

3.14.4 Cross-Cutting Regulations–Environmental Consequences

The cross-cutting regulations and proposed regulatory alternative identified in Table 2-1 include similar changes to the regulations in all of the three sanctuaries. The proposed actions and alternatives would not affect any scenic views, so no adverse impacts on visual resources associated with the cross-cutting regulations would occur. Reducing discharges from vessels and cruise ships may result in cleaner water. The improvement in water quality may be slightly visible to sanctuary users, providing a minor beneficial visual effect.

3.14.5 Cordell Bank National Marine Sanctuary –Environmental Consequences

The Proposed Action

The only proposed action that would have any potential for visual impacts is the proposed seabed protection regulation. The proposed benthic habitat protection regulation would not affect visual resources.

Seabed Protection

The proposed regulation would prohibit drilling, dredging, or altering, constructing, placing, or abandoning any structure material or matter on the submerged lands within the line representing the 50-fathom isobath surrounding Cordell Bank. Additionally, the regulation would prohibit the same activities listed above in the remainder of the sanctuary outside the 50-fathom isobath, with the exception of anchoring. As such, the Proposed Action would prohibit the introduction of any visible structures or features that are substantially out of character with the local surroundings. However, it is highly unlikely that any visible structures would be constructed under the current regulations, due to the remote offshore location and existing prohibitions (e.g., oil and gas facilities are not permitted). Visitors would continue to see some anchored vessels and ongoing lawful fishing activity. As a result of this proposed regulation, there would be the potential for very minor beneficial impacts on visual resources.

Alternative Regulatory Actions

The seabed protection alternative would have the same impacts as identified in the Proposed Action.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed; this would result in no impacts on visual resources within CBNMS.

3.14.6 Gulf of the Farallones National Marine Sanctuary –Environmental Consequences

The Proposed Action

Deserted Vessels

A proposed regulation would prohibit deserting a vessel in the Sanctuary and would prohibit leaving harmful matter aboard a grounded or deserted vessel. This would prohibit the introduction of physical features that are substantially out of character with local surroundings, because visitors to the Sanctuary would not see discarded vessels, damaged habitats, or debris and potential spills resulting from vessel groundings. As a result of this proposed regulation, there would be beneficial impacts, such as maintaining the natural seascape of the ocean.

Alternative Regulatory Actions

There is no alternative that would impact visual resources.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on visual resources within GFNMS.

3.14.7 Monterey Bay National Marine Sanctuary–Environmental Consequences

The Proposed Action

Deserted Vessels

The impacts of this proposed regulation would be the same as those described for the proposed GFNMS deserted vessel regulation. Implementation of this regulation in MBNMS would result in a minor beneficial impact on visual resources.

Boundary Changes - Davidson Seamount

The Proposed Action would add Davidson Seamount to MBNMS. This would expand MBNMS prohibitions on drilling into, dredging, or otherwise altering the seabed of Davidson Seamount. It also would prohibit constructing, placing, or abandoning any structure, material, or other matter on the seabed except as incidental to and necessary to six predetermined activities in certain areas. This would prohibit the introduction of physical structures and features that are substantially out of character with local surroundings, because visitors to the Sanctuary would not see physical features above and below the surface of the water. While Davidson Seamount is far offshore and not within a sensitive viewshed, the Proposed Action would result in a slight beneficial impact by maintaining the natural seascape of the ocean.

Motorized Personal Watercraft

The Proposed Action would revise the definition of motorized personal watercraft in order to minimize disturbance of marine wildlife by MPWC and minimize user conflicts between MPWC operators and other recreationists within MBNMS. At the same time, a new seasonal MPWC zone would be established off of Pillar Pt. Although changing the definition of MPWC would change certain types of watercraft activities, it would not prevent watercraft activities entirely. Watercraft activities would still be permitted within five designated areas. Restricting MPWC use to the five zones would not have an adverse effect on the sanctuary's visual resources, as four of these zones already exist and are being used for MPWC and the fifth zone is in an area where larger MPWC (that are not within the definition of MPWC) are currently used. Very minor beneficial effects may occur to the extent that existing MPWC activity outside of the MPWC zones currently intrude on or adversely affect sensitive viewing points or viewsheds. Impacts on recreational MPWC use are addressed in Section 3.11, Public Access and Recreation.

Dredge Disposal

Redefining and properly locating the SF-12 dredge disposal site would reduce the amount of material brought back into the surf zone during high-energy events resulting in less turbidity for ocean recreationists. Reduced material (i.e., decomposing biotic matter) in the beach area will also result in beneficial impacts on visual resources.

Alternative Regulatory Actions

The alternatives would have the same impacts as identified in the Proposed Action, with the following differences.

Motorized Personal Watercraft Alternative

This alternative would prohibit MPWC in MBNMS entirely by redefining MPWC and removing the MPWC zones in various locations along the coastline. This would not prevent other types of watercraft activities in MBNMS. No adverse effect on existing scenic resources would occur. Slight beneficial effects may occur as a result of removing MPWC use from nearshore scenic areas.

The No Action Alternative

The No Action alternative would be to continue to manage the Sanctuary as it is currently managed. This would result in no impact on visual resources within MBNMS.

3.14.8 Cumulative Impacts

The ROI for cumulative impacts is the same as the ROI described above. Generally speaking, coastal populations and ocean-based recreational activities are increasing. As a result, coastal housing and development and use of coastal and oceanic resources are increasing, causing a loss of natural visual resources.

Coastal housing, development, and armoring projects would affect natural visual resources. These impacts would primarily involve the sanctuaries with coastline boundaries. Increased recreation activities are cumulative actions that would also affect natural visual resources in all three sanctuaries.

Implementation of the FMPs will contribute to the ROI's regional ecosystem health by applying the various action plans in CBNMS, GFNMS, and MBNMS. Cross-cutting ecosystem management measures as well as Sanctuary-specific ecosystem action plans will ensure an aesthetically pleasing view of the sanctuaries by protecting and preserving habitats and wildlife. A coastal armoring program coordinated with the California Coastal Commission and other agencies, under the MBNMS action plan, could affect visual resources along the coastline. However, it is assumed that guidelines and alternatives to armoring developed through agency coordination would keep this impact to a minimum.

The Proposed Action

Ongoing coastal development is likely to have adverse impacts on visual resources, although implementation of the action plans would help to protect those resources. Because the proposed actions would result in beneficial impacts on visual resources, the Proposed Action would not contribute to an adverse cumulative impact on visual resources, and would help mitigate for ongoing cumulatively adverse impacts.

Alternative Regulatory Actions

Cumulative impacts under the Alternative Regulatory Actions would be the same as those resulting under the Proposed Action.

The No Action Alternative

Ongoing coastal development is likely to have adverse impacts on visual resources, although implementation of the action plans would help to protect those resources. The No Action alternative would not contribute to an adverse or beneficial cumulative impact on visual resources.