Gulf of the Farallones National Marine Sanctuary Management Plan

Gulf of the Farallones

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
Marine and Estuarine Management Division

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Gulf of the Farallones National Marine Sanctuary Management Plan

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Marine and Estuarine Management Division

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Gulf of the Farallones

GULF OF THE FARALLONES NATIONAL MARINE SANCTUARY MANAGEMENT PLAN

November 1987

Prepared for:

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
Marine and Estuarine Management Division

Prepared by:

James Dobbin Associates Incorporated
Coastal and Ocean Planners
Alexandria, Virginia
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THE EXECUTIVE SUMMARY

This management plan was prepared for the Gulf of the Farallones National Marine Sanctuary — one of two such sanctuaries in California. (The other site is the Channel Islands National Marine Sanctuary in southern California.) National marine sanctuaries are ocean areas protected and managed for their significant natural and cultural resources and human uses. Management generally consists of environmental education activities, research that focuses on marine issues, and better coordination among regulatory agencies. Management also increases protection of marine populations and habitats through monitoring and contingency planning.

The Gulf of the Farallones National Marine Sanctuary encompasses 948 square nautical miles of nearshore and offshore waters of the eastern Pacific. The area was designated in 1981 in accordance with Title III of the Marine Protection, Research, and Sanctuaries Act. This management plan is a means of ensuring that the activities planned for the sanctuary over the next ten years comply with the overall intent of the program and the objectives stated in the *Final Environmental Impact Statement* (National Oceanic and Atmospheric Administration 1980) for the site's designation.

Objectives

The plan updates the goals and objectives for the sanctuary as presented in the *Final Environmental Impact Statement* (National Oceanic and Atmospheric Administration 1980). The improved protection of the marine environment and resources of the sanctuary is the general goal given highest priority. Compatible multiple use of the ocean area, increased public awareness and support, and a management-oriented research program are other important and complementary goals. In the plan, detailed objectives are provided for each goal which represent clear targets against which the success of the program can be evaluated.

Sanctuary Environment and Resources

Located in the waters just north of San Francisco, the Gulf of the Farallones National Marine Sanctuary provides many examples of the marine life and habitats characteristic of the cold temperate waters of the eastern Pacific marine region that extends from Point Conception to British Columbia.

Most of the sanctuary lies in the Gulf of the Farallones between the western edges of the continental shelf and the coasts of Marin and Sonoma counties. Some of the largest and most diverse eastern Pacific populations of seabirds and pinnipeds (seals and sea lions) south of Alaska occur in the Gulf. Large flocks of Cassin's auklets, common murres, western gulls, and the endangered brown pelican feed on the small fish and crustaceans that are abundant in the surface waters of the sanctuary. These food resources also support California's largest breeding population of harbor seals and a rapidly growing population of northern elephant seals. Large numbers of whales and dolphins, including the California gray whale and the Pacific humpback whale population, are found in the area. There are many other significant nearshore habitats represented within the sanctuary such as the extensive wetlands of Tomales Bay and Bolinas Lagoon and the large intertidal and subtidal reef at Duxbury Reef. A complete spectrum of marine habitats ranging from the intertidal to the pelagic and deep oceanic environments can therefore be found within this sanctuary.

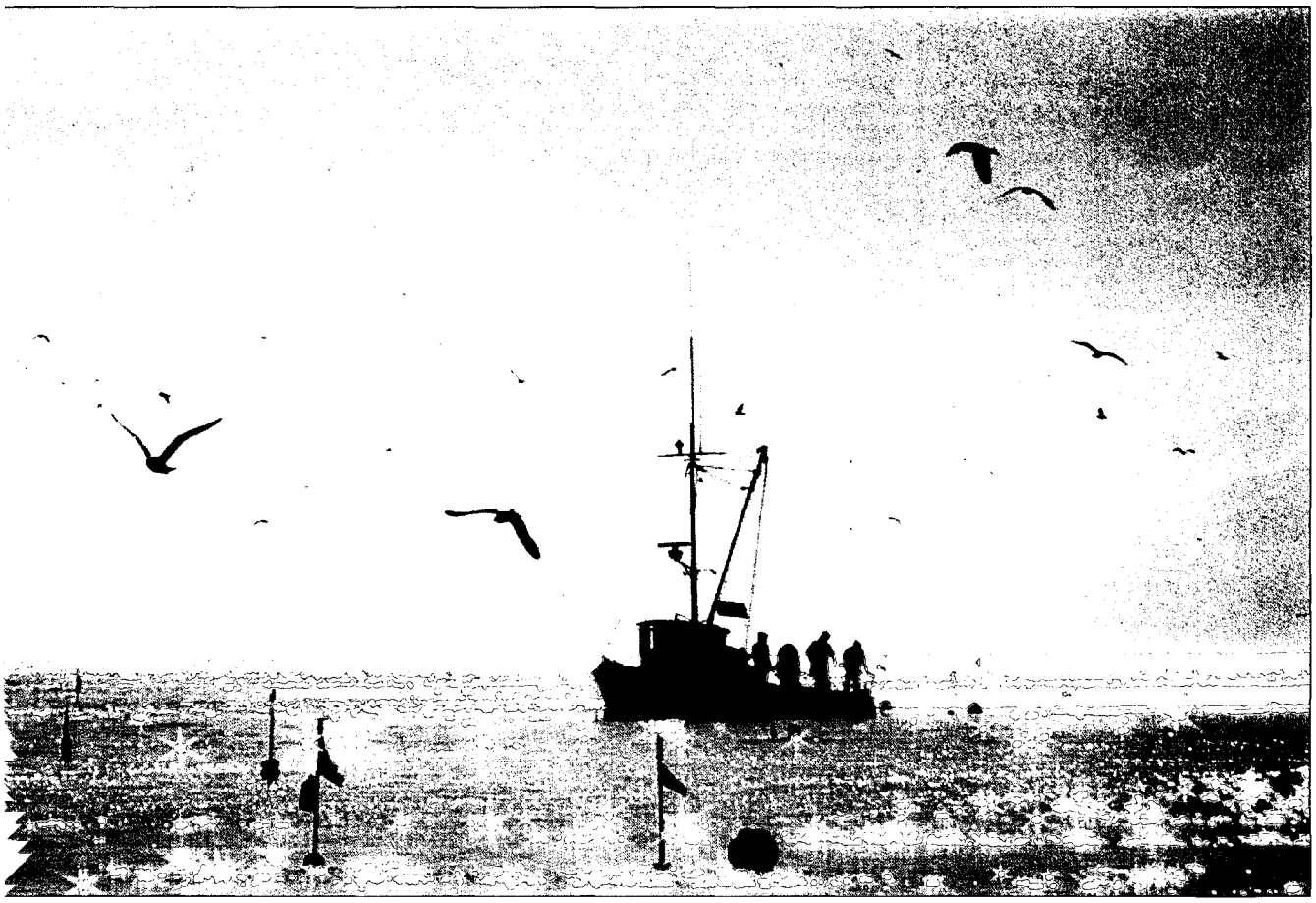
Marine Uses

The sanctuary also illustrates how the ocean and its resources are important for the economic and social well-being of a region. The area supports many large commercial fisheries including a large percentage of San Francisco's bottom-trawling and salmon-trolling fleet. Sport fishing for salmon, rockfish, and other species is a very popular activity that generates revenue for the partyboat fleets operating out of San Francisco Bay, Half Moon Bay, and Bodega Bay. Whalewatching and offshore excursions are other uses of the sanctuary that are steadily growing in popularity. And of course, the sanctuary contains some of the west coast's busiest shipping lanes.

Management Concerns

While the sanctuary continues to provide relatively undisturbed and natural habitats for marine life, recent observations and ongoing research indicate some changes that are of particular concern for sanctuary management. There is, for example, a need to better understand the long-term effects of potential accidental oil spills and chronic pollution of resources, since these are still poorly understood. Increasing numbers of seabirds and small cetaceans such as the harbor porpoise become entangled in gill nets, but the effects of this incidental take on populations are not known.

The plan identifies many other concerns or issues for sanctuary management such as the lack of public awareness of the site's existence and the need for greater coordination among the agencies that have jurisdiction within the area. These issues and others are the basis for an action plan that is organized into three program areas: resource protection, research, and interpretation and education.



Resource Protection

The resource protection program addresses in a comprehensive manner the problems that have been affecting habitats or populations within the sanctuary in recent years. Specific measures include:

- a public information program aimed at disseminating marine resource regulations and policies including existing laws and guidelines mutually enforced by collaborating agencies;
- more effective and directed "on-the-water" surveillance and enforcement of regulations;
- procedures for a coordinated review and evaluation of policy revisions and/or proposed new activities and developments that could affect sanctuary resources;
- improved contingency planning and additional measures for emergency response to deal with accidental discharge of pollutants;
- development of a management-oriented information base that can be used for monitoring or as a readily accessible baseline for making policies.

Research

Scientific research is encouraged at the sanctuary, particularly where research results can help resolve key management questions. The plan outlines general priorities for research for the next decade. These include:

- baseline studies for populations and habitats whose presence were critical in the sanctuary's designation, yet whose distributions and other basic characteristics remain poorly understood;
- directed monitoring studies focusing on indicator species and representative habitats and undertaken jointly with other agencies;
- analytical studies aimed at determining the cause of a condition or impact (in a specific population for example).

The program includes additional procedures aimed at ensuring that research projects address management issues and that results are effectively integrated into the education and resource protection programs.

Interpretation and Education

Environmental education and interpretative efforts at locations overlooking the sanctuary, within the sanctuary, and in the broader San Francisco Bay area are an important component of the plan. The aim is to develop a program that can lead to active and widespread public support.

The main activities included in the plan are as follows:

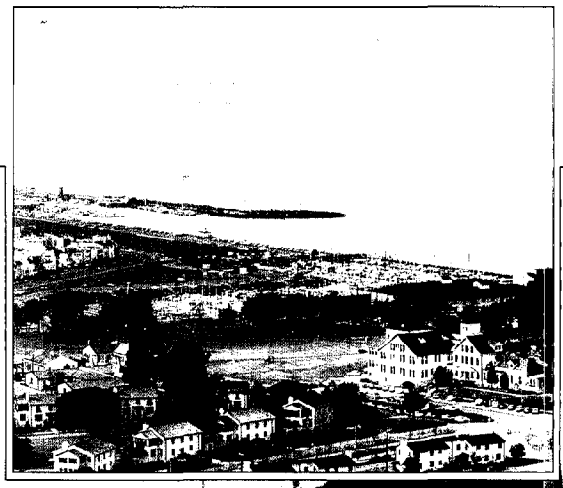
- design and production of high-quality printed materials such as brochures and posters that can be used for general program orientation and in public outreach;
- special sanctuary offshore excursions and coastal walks;
- lecture series and special field seminars;
- design and production of outdoor wayside panels to be located at points overlooking the sanctuary;
- design and production of exhibits and audio-visual presentations to be used in regional educational facilities;
- coverage in the local media and Bay Area promotional publications;
- investigating the need for an additional visitor facility.

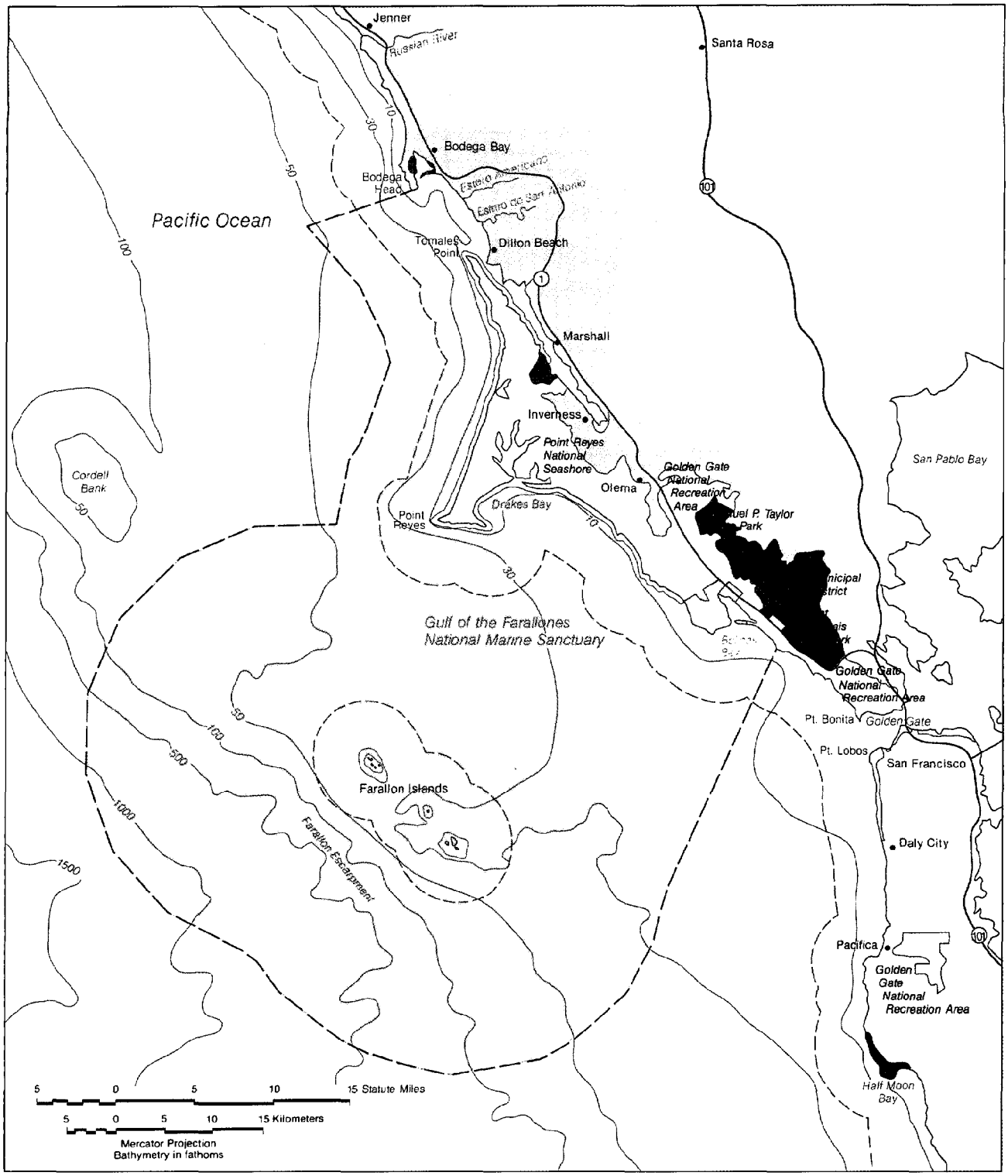
The Marine and Estuarine Management Division will undertake many of these activities in collaboration with the extensive local network of private non-profit and public organizations that offer educational services in the San Francisco Bay area.

Administration

The administration of the sanctuary is the responsibility of the Marine and Estuarine Management Division of the National Oceanic and Atmospheric Administration and its on-site staff. The Division coordinates activities, designs and implements programs, and determines priorities for education and research. The California Department of Fish and Game is the agency authorized to conduct on-site surveillance and enforcement within the sanctuary under an agreement with the Division. The National Park Service provides assistance to the Division in day-to-day administration, and developing and implementing the education program, on-site interpretation, and the research program.

The emergence of new issues may affect specific aspects of sanctuary management as described in this plan. However, the overall goals, management objectives, and guidelines will continue to be relevant and all actions will continue to be a step towards realizing the long-term resource protection goal. During the next few years, the aim is to carefully adjust the plan to changing circumstances and possibly expand it with new programs in light of the experience gained in actual management and with the support of other agencies and the public.





Gulf of the Farallones National Marine Sanctuary Boundary

3-Mile Limit

Federally Managed Parks

State and Locally Managed Parks

Figure 1

Regional Context

About this plan . . .

This management plan is designed to inform sanctuary users and the general public about the Gulf of the Farallones National Marine Sanctuary and the various activities that are planned for the site over time. The *Final Environmental Impact Statement* and final regulations established the sanctuary boundary and regulatory controls, with the sanctuary formally being designated in 1981. This plan serves to guide the agencies responsible for sanctuary management in implementing the goals and objectives stated in the *Final Environmental Impact Statement.*

The National Marine Sanctuary Program is responsible for the review and periodic update of this plan so that it reflects the information and experience gained through sanctuary operations. Readers are invited to contribute their comments and suggestions to this ongoing process. For further information about the sanctuary, readers may contact:

Sanctuary Manager
Gulf of the Farallones
National Marine Sanctuary
Fort Mason, Building 201
San Francisco, California 94123
(415) 556-3509

Marine and Estuarine Management Division
Office of Ocean and Coastal Resource Management
National Oceanic and Atmospheric Administration
1825 Connecticut Street, N.W.
Washington, D.C. 20235
(202) 673-5126

PROJECT TEAM

James Dobbin Associates Incorporated, Alexandria, VA
James Dobbin, Project Director
Michele Lemay, Project Manager
Nancy Dobbin, Editor
Shelley Laskin, Cartographic Production Manager
Julia Sandquist, Senior Cartographer
Patricia Snell, Document Production

National Oceanic and Atmospheric Administration
Office of Protected Resources and Habitat Programs
National Marine Fisheries Service
Nancy Foster, Director

Office of Ocean and Coastal Resource Management
National Ocean Service
Phil Williams, Project Manager and COTR

Gulf of the Farallones National Marine Sanctuary
National Ocean Service
Miles Croom, Sanctuary Manager
Nancy Stone, Deputy Sanctuary Manager

National Park Service
Western Regional Office
Gary Fellers, Sanctuary Research Coordinator

Golden Gate National Recreation Area
Marti Leicester, Chief of Interpretation

California Department of Fish and Game
Mike Wade, Patrol Captain
Bob Kucera, Sanctuary Warden

Graphic Design and Art Production
Mary Moehle, Baseline Designs, San Francisco, CA

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Stephanie Kaza, Point Reyes Bird Observatory
Jody Loeffler, California Coastal Commission
Greg Moore, Golden Gate National Park Association
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John Sansing, Point Reyes National Seashore
Steve Scholl, California Coastal Commission
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One

Gulf of the Farallones
National Marine Sanctuary

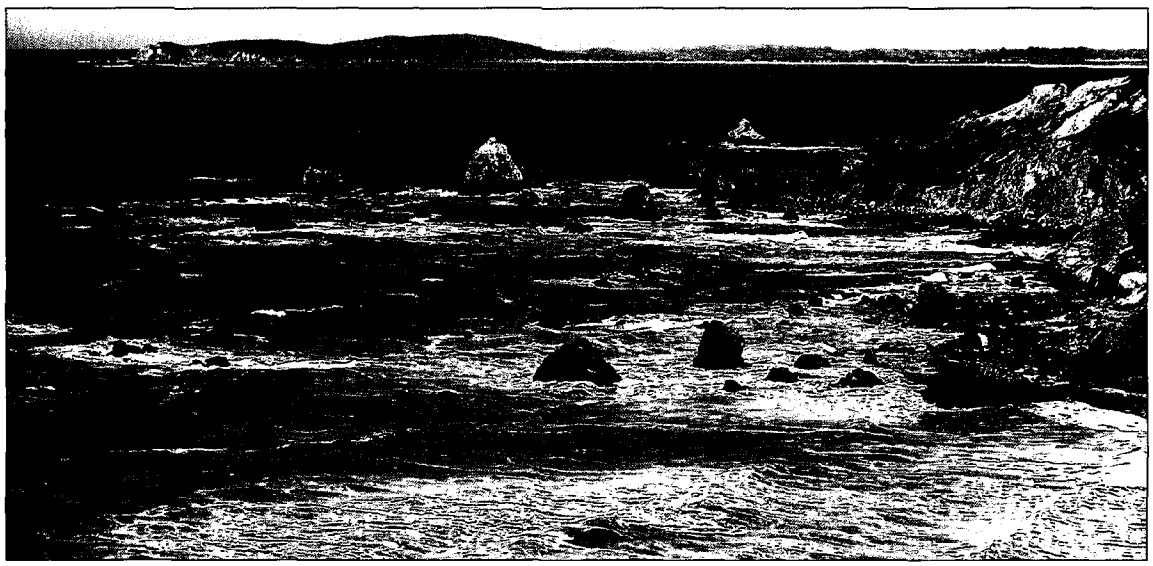
INTRODUCTION

INTRODUCTION

BACKGROUND

Located just a few miles from cosmopolitan San Francisco, the waters of the Gulf of the Farallones National Marine Sanctuary provide a compelling glimpse of a nationally significant marine environment. Diverse populations of seabirds feed within these waters, as well as important populations of seals and sea lions; whales and dolphins are commonly sighted here, feeding and migrating each year. Large plankton blooms result mainly from the seasonal upwelling of cold, nutrient-rich water off the continental slope. The plankton supports a food chain that includes large stocks of commercial fish and invertebrates, which in turn provide food for seabirds and marine mammals.

This oceanic expanse, encompassing 948 square nautical miles of nearshore and offshore waters of the eastern Pacific, was designated as a national marine sanctuary in 1981. The Gulf of the Farallones constitutes the largest portion of the sanctuary, lying over an exceptionally wide part of the continental shelf that extends almost 30 nautical miles into the Pacific Ocean. The sanctuary also includes protected nearshore habitat surrounding the Farallon Islands and sheltered bays and wetlands along the coastline of Marin and Sonoma counties.



The sanctuary plays an important role in the national system of sanctuaries. Representing the only site yet designated north of Point Conception, California, it contains species and marine habitats characteristic of the eastern Pacific coast from Point Conception north to British Columbia and Alaska. As the only national marine sanctuary adjacent to the mainland, this site includes many coastal access points relatively close to a major urban center, the San Francisco Bay area. In fact, because of its accessibility and proximity to San Francisco Bay, the sanctuary is expected to play a prominent role in representing the National Marine Sanctuary Program on the west coast.

National marine sanctuaries are areas set aside for the careful management of their unique or significant natural and cultural resources and uses. This is accomplished through programs for research and education in the marine environment and improved coordination among regulatory agencies having jurisdiction in these waters. General procedures for selecting, designating, and administering sites are presented in the *National Marine Sanctuary Program Regulations* (15 CFR Part 922). Of paramount importance in these regulations is the preparation of a management plan as a means of ensuring that activities and development planned for the sanctuary comply with the intent of the program. The practical experience of on-site management of national marine sanctuaries can be used to gradually improve the general management of adjacent coastal and marine resources.

The Gulf of the Farallones National Marine Sanctuary is one of two established sanctuaries in California. The other is the Channel Islands National Marine Sanctuary in southern California (NOAA, 1983b). This management plan for the Gulf of the Farallones National Marine Sanctuary is designed to inform the general public about activities planned over the next five to ten years. The plan includes general policies and procedures that will help the Marine and Estuarine Management Division and collaborating agencies make informed decisions about the area and its resources. It also describes specific actions for resource protection, research, interpretation, and education within the sanctuary.

The successful implementation of this plan depends on cooperation among the government agencies that regulate resources and uses within the sanctuary. These agencies include the Marine and Estuarine Management Division of the National Oceanic and Atmospheric Administration, the Sanctuary Manager and other on-site staff, the National Park Service at the Golden Gate National Recreation Area and the Point Reyes National Seashore, the California Department of Fish and Game, the U.S. Coast Guard, and others. The plan also needs the support of non-government organizations and members of the general public who are interested in and committed to the ocean's well-being.

Variable funding and shifts in priorities for the national program may affect specific aspects of sanctuary management as described in this plan. The scale of programs and the timing for their completion may have to be adjusted according to such unforeseeable factors. Nonetheless, the goals, management objectives, and general policies contained in this plan will continue to guide decisions.

MANAGEMENT GOALS AND OBJECTIVES

The *Final Environmental Impact Statement* (NOAA, 1980), prepared during the designation process, contained general goals for the Gulf of the Farallones National Marine Sanctuary. These have been updated here to reflect the experience gained in managing research and education activities during the years since designation. Three goals provide the foundation for sanctuary management: they relate to resource protection, research, and interpretation and education. The more detailed objectives listed under each goal represent targets against which programs will be evaluated periodically.

(A) Resource Protection

The goal assigned highest priority for management is the improved protection of the marine environment and resources of the sanctuary, consistent with the existing policies of regulatory agencies.

Specific objectives for resource protection are as follows:

- Work toward developing cooperative and integrated programs and policies for the sanctuary and encourage better coordination among all agencies (Federal, state, and local) who participate in the sanctuary's resource management.
- Encourage all agencies to consider appropriate marine resource protection policies when reviewing and evaluating development proposals or permit applications for the sanctuary, and for areas adjacent to it.
- Participate in the development of improved marine resource protection policies, laws, and regulations for the sanctuary.
- Develop a public information program that emphasizes the sensitivity of resources and responsible use; this should enhance visitors' voluntary compliance with regulations.
- Improve such management techniques as contingency planning and emergency response efforts to reduce threats to resources.

(B) Research

Research should help in solving specific management problems, enhance resource protection efforts, and assist in the interpretation of the resources for visitors.

Specific objectives for the research program are as follows:

- Assess the sanctuary's information base to identify gaps in knowledge that can affect our ability to manage the area.
- Conduct studies of species or marine communities to identify resources most in need of management attention.
- Promote the sanctuary as a site for management-related marine research by providing financial and logistical support for scientific investigations that address critical marine resource protection issues.
- Design research projects that are responsive to management concerns and that contribute to improved management of the sanctuary.
- Make effective use of research results by incorporating them into interpretive and resource protection programs.
- Encourage information exchange and cooperation among all the organizations and agencies undertaking management-related research in the sanctuary to promote more informed management.

(C) Interpretation and Education

The interpretation and education programs are designed to enhance public awareness and understanding of the sanctuary, and to promote the need for and benefits of long-term comprehensive management of its marine resources. Programs will be of professional-level quality and designed to elicit a favorable response from the public. Program goals are to increase appreciation and support for marine resource protection in general, and for the sanctuary in particular.

Aims of the interpretive programs are as follows:

- Provide the public with accurate information about the sanctuary, about current marine resource protection issues and activities, and about the National Marine Sanctuary system.
- Use the sanctuary to illustrate to the public the broader marine issues, concerns, and management policies that are currently being addressed in marine protected areas around the world.
- Offer the public opportunities for first-hand appreciation of the sanctuary by improving access to appropriate areas within the sanctuary and by other means that are compatible with resource protection objectives.
- Assess current levels of use and monitor human impact over time to determine visitor carrying capacity in vulnerable areas and to minimize potential use conflicts.
- Broaden public support for the sanctuary by offering programs suited to visitors of diverse interests, ages, and background.
- Collaborate with local organizations to provide interpretive services complementary to the sanctuary program and to develop a strong network of support in the local community.
- Stimulate public involvement by establishing volunteer programs, by having sanctuary staff participate in school and community outreach programs, and by encouraging the public to express their opinion of the program's effectiveness and usefulness.

The goals and objectives presented above are the foundation of this management plan for the sanctuary. They also support the national program's mission, for progress in each sanctuary translates into progress for the national program.

Since the national program is relatively new, ongoing review of its management approaches and policies is essential. It is only with regular evaluation that the Marine and Estuarine Management Division will be able to confirm that it has established meaningful guidelines. Since this is one of only a few programs in the world building a capability for resource management in marine protected areas, experience gained at this large cold-water site can make significant contributions to marine protection internationally.

TWO

Gulf of the Farallones
National Marine Sanctuary

THE SANCTUARY ENVIRONMENT

THE SANCTUARY ENVIRONMENT

The Gulf of the Farallones National Marine Sanctuary is significant as a local, regional, and national resource. Most of the sanctuary lies in the Gulf of the Farallones between the western edges of the continental shelf and the coasts of Marin and Sonoma counties. Some of the largest and most diverse eastern Pacific populations of seabirds and pinnipeds south of Alaska occur in this Gulf. Large numbers of whales and dolphins, including the California gray whale and the Pacific humpback whale, are found in the area. Intertidal and subtidal habitats contain a varied and abundant invertebrate fauna that in several locations has been monitored for almost twenty years. The site also includes two of the few relatively undeveloped estuaries remaining in California.

The resources and the strategic location of the area combine to support a variety of activities including commercial fishing and shipping, sportfishing, sailing, offshore nature excursions, and marine scientific research. Yet in spite of these activities, most parts of the sanctuary remain relatively undisturbed. But recent events and proposals for the site could herald change for the marine environment and therefore warrant the immediate concern of sanctuary management. This section of the management plan profiles the sanctuary briefly, and introduces many of the factors that may affect its management over the next ten years.

REGIONAL SETTING

(A) Sanctuary Location and Boundaries

The sanctuary represents an area of 948 square nautical miles (1756 square kilometers) off the central California coast, the second largest existing national marine sanctuary in the United States. It is located between 38° 18'N and 37° 29'N latitude (see figure 1). The sanctuary belongs to the Oregonian marine province of the Eastern Pacific Boreal Region (Briggs 1974). Habitats and subtidal and intertidal species of this area are representative of cold temperate marine waters extending from Point Conception north to British Columbia.

The offshore boundary of the sanctuary extends seaward 6 nautical miles from the mean high tide line in the northern part of the sanctuary (between Bodega Head and the Point Reyes Headlands). The boundary then follows a 12 nautical mile arc around the Farallon Islands (including Noonday Rock), and extends back to the shore at Rocky Point south of Bolinas Lagoon. The shoreward boundary of the sanctuary follows the mean high tide line except along the Point Reyes National Seashore where it follows the seaward boundary of the park that extends a quarter mile offshore. The sanctuary includes Bolinas Lagoon, Estero San Antonio, Estero de Americano, Tomales Bay, and Bodega Bay, but not Bodega Harbor (see figure 1). Coordinates for the sanctuary boundaries are included in Appendix 1.

(B) Regional Access and the Role of the Sanctuary in the San Francisco Bay Area

Over 58 coastal access points in Sonoma, Marin, San Francisco, and San Mateo counties provide a direct view over the sanctuary (NOAA 1984c). Most of these access points are located in Federal, state, and local parks adjacent to the sanctuary including the Golden Gate National Recreation Area, the Point Reyes National Seashore, several state beaches, and county parks. Access for private and chartered recreational vessels destined for the sanctuary is provided primarily at the marinas in San Francisco Bay, Bodega Harbor, Tomales Bay, and Half Moon Bay. It is expected that programs for this sanctuary will be directed at and will involve a large regional population viewing, gaining access, and experiencing the sanctuary from these many different vantage points.

The main sanctuary offices are located at Fort Mason in San Francisco, which is also the National Park Service's headquarters for the Golden Gate National Recreation Area. All NOAA-funded management programs for the sanctuary are coordinated from this location which provides ready access to the region's many ocean-related government and private organizations and to the general public.

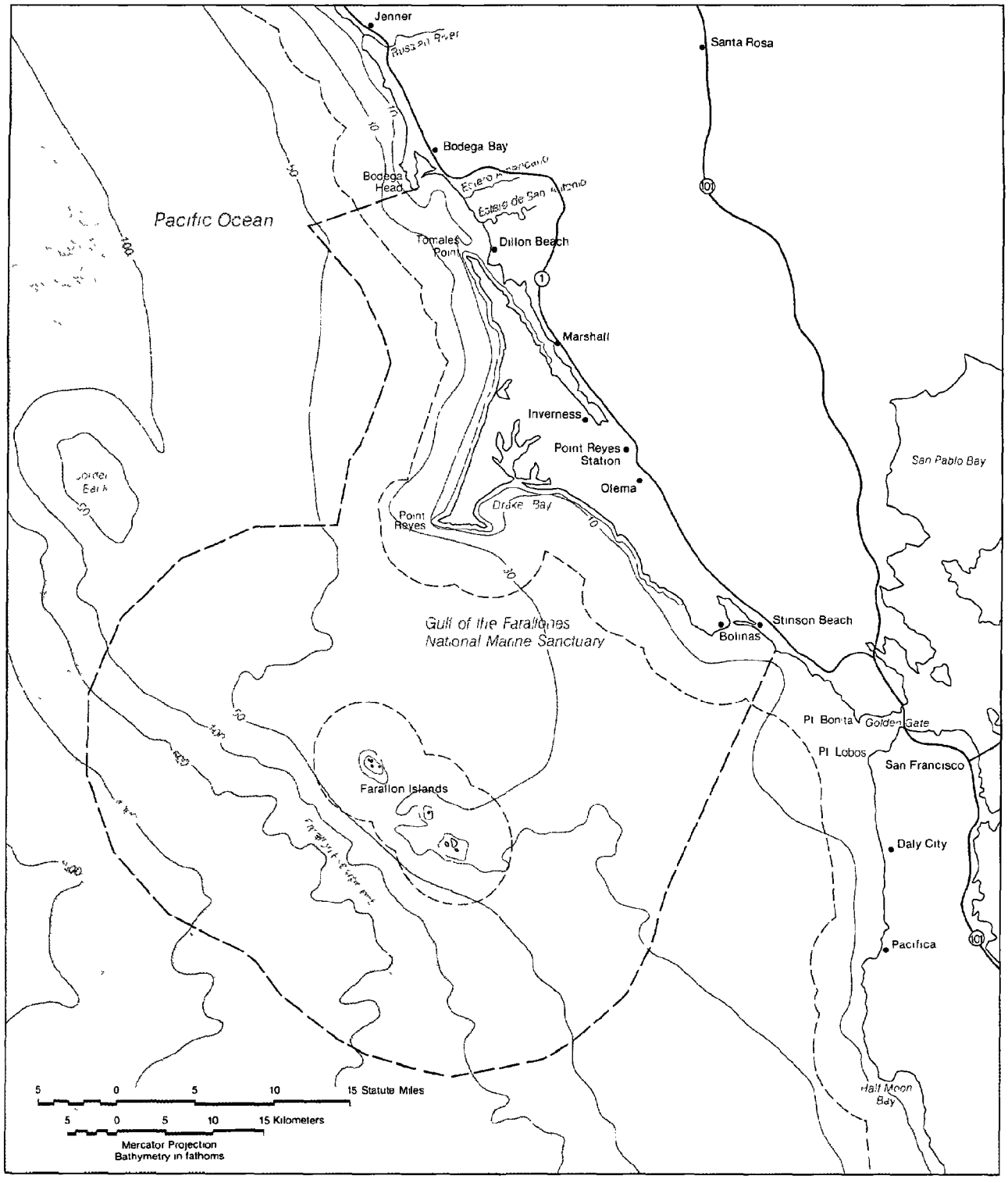
The future management of the sanctuary will be influenced by development trends in the broader San Francisco Bay area. As the regional population increases, there will be a greater demand for education and recreation-related services within the Gulf of the Farallones and adjacent coastal areas. Greater pressure will be exerted on the resources as the number and demands of users increase. The sanctuary management program should expand in accordance with overall program objectives.

There are many other regional trends that will affect the sanctuary's management. The sanctuary's location adjacent to the Bay partly overlaps one of California's busiest ocean traffic corridors. Approximately three tankers enter the Bay area every day and the area's refineries account for about 33 percent of the state's total refining capacity (Minerals Management Service 1983). Industrial activity is likely to continue to concentrate here.

The sanctuary borders some of California's least-developed coasts. Existing policies including the California Coastal Act call for limited development in both Sonoma and Marin counties except in the immediate vicinity of the existing small towns. Because the sanctuary is large and includes both an adjacent rural and urban component, the plan must be flexible enough to deal with a broad range of concerns. These will vary greatly in scale, from local problems of sedimentation in estuaries to regional problems of increasing ocean traffic.

SANCTUARY RESOURCES

Our knowledge of the sanctuary's resources, particularly those dependent on the Farallon Islands and the Point Reyes Peninsula, is extensive in comparison to knowledge of other areas in northern and central California. Several parts of the sanctuary have been set aside as protected areas and their special resources have been subject to study for some time. In recent years, investigations initiated as part of the sanctuary research program have added to our understanding of the areas offshore, and the relationships among coastal, nearshore, and oceanic parts of the sanctuary. What is known about the sanctuary's resources and the many questions that remain are briefly introduced here as a basis for future programs.



Gulf of the Farallones National Marine Sanctuary Boundary

Continental Slope (>100 fa)

Outer Shelf (50-100 fa)

Inner Shelf (<50 fa)

Nearshore (<10 fa)

Figure 2

Bathymetry

(A) Environmental Conditions

Southwest of the Farallon Islands, the shelf drops abruptly to depths of 400 fathoms (2400 feet). The 1000 fathoms (6000 feet) line is about 15 nautical miles southwest of the islands. The islands are located about 26 to 28 nautical miles from the mainland on a submarine ridge that extends north about 17 nautical miles to Cordell Bank. The Gulf of the Farallones is a broad and shallow extension of the continental shelf, interrupted along its western edge by the granite ridge of the Farallon Islands (see figure 2). Depths within the Gulf average 30 fathoms (180 feet) with the shelf gently sloping towards the northwest.

The submarine geology is broadly divided into two areas. Fine silt and clay deposits prevail north of the Point Reyes Headlands. A flat sandy plain extends over the southern part of the sanctuary from the Farallon Islands to the entrance of San Francisco Bay. This is the most extensive sandy area in California's offshore — probably evidence of large volumes of sediments discharged over millions of years by the Sacramento-San Joaquin Rivers through the Bay (Welday and Williams 1975). These rivers continue to supply large volumes of fine sediments to the nearshore. There are two documented sedimentary basins with unknown hydrocarbon resources located north and south of sanctuary boundaries (the Bodega and Santa Cruz basins) (U.S. Bureau of Land Management 1980).

The distribution of sediments and the underwater topography tend to be more complex near the coast (see figure 3). This provides for a diversity of intertidal and nearshore habitats including the unusual shale reefs at Duxbury Reef, and the wave-cut surge channels and sea caves extending into the highly fractured rock of the Farallon Islands.

Several small bays are located along the coast. Bolinas, Drakes, and Bodega Bays are open to the ocean, but are sheltered from coastal currents by Duxbury Point, Point Reyes Headlands, and Bodega Head, respectively. Tomales Bay is a submerged rift valley formed by the San Andreas Fault. Estuaries and lagoons are located along the mainland coast, including Estero Americano, Estero de San Antonio, and Bolinas Lagoon in the sanctuary, and Drakes Estero and Limantour Estero in adjacent areas.

These contrasts in submarine and coastal landforms provide important opportunities for educational and interpretive activities. Interpretive activities can communicate basic differences among habitats in the sanctuary. They can also explain relationships between what can be seen on the land (i.e., geological formations) and the ocean floor.

Other implications of the site's coastal and submarine geology are:

- the residence time of oil and other pollutants in nearshore and coastal areas and relative vulnerability of various coastal types to accidental discharge of pollutants; and
- the appropriateness of different oil spill cleanup and containment techniques.

Ocean Currents

The dominant oceanic current in the sanctuary is the California Current, which flows southward from Alaska to Mexico. During the year, several oceanographic phenomena affect this general movement such as the northward flowing Davidson Counter Current prevailing during the winter, upwelling processes, local gyres and eddies, and tidal exchanges with San Francisco Bay.

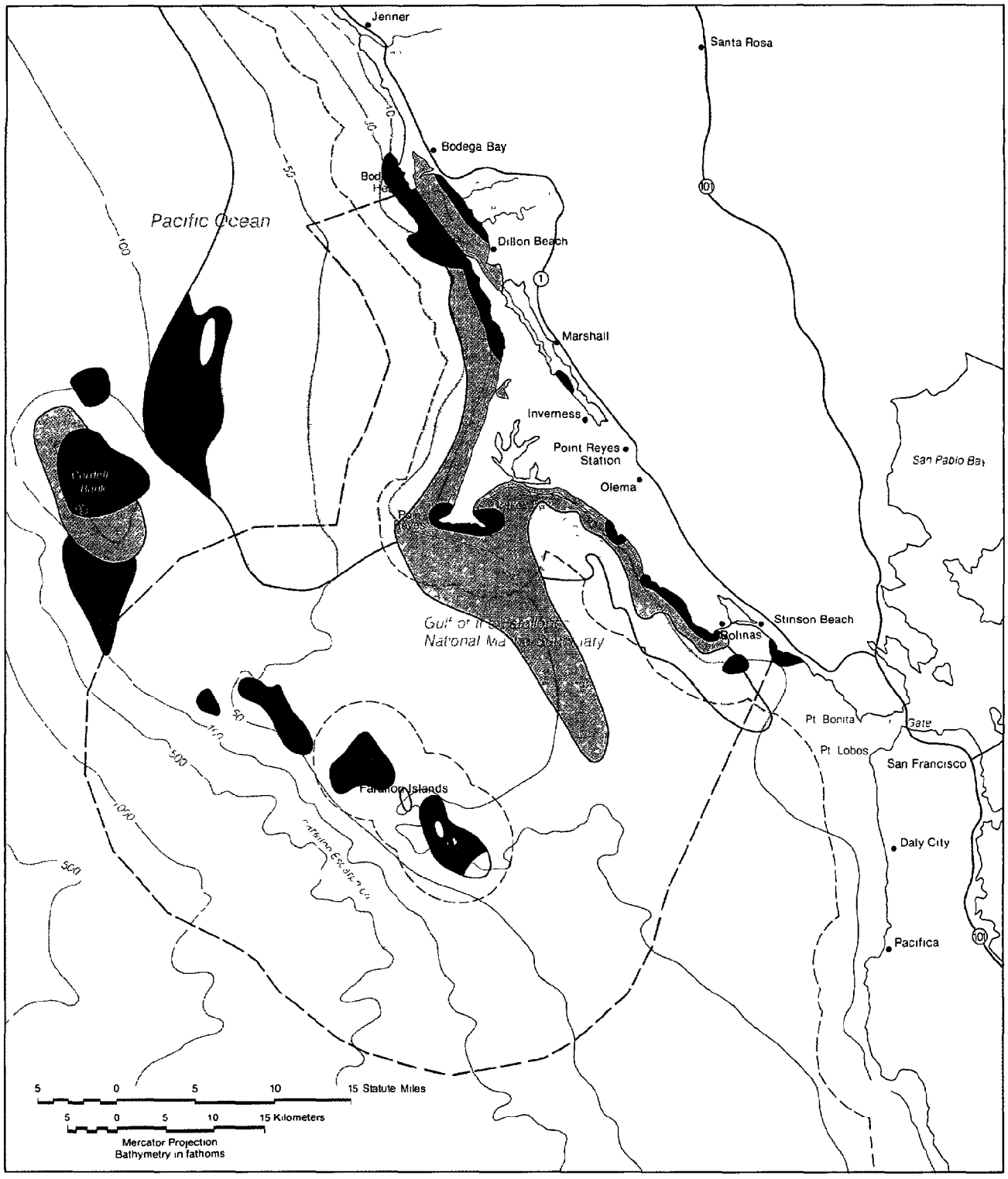
The three distinct ocean seasons along the central California coast are: the oceanic period (July-October); the Davidson Current period (October-March); and the upwelling period (March/April-July).

The oceanic period is the season in which the California Current dominates the circulation pattern. This diffuse and meandering current transports low-temperature, low-salinity, high-nutrient, and highly oxygenated subarctic water southward along the coast (Minerals Management Service 1983).

The Davidson Counter Current may be the surface expression of the northward flowing Equatorial water undercurrent. It appears nearshore during the winter when the wind direction is northward along the California coast. The current carries oxygen-poor, nutrient-rich waters that are characteristically warmer and more saline than the California Current.

Coastal upwelling takes place when northwest winds drive the current south. This has the effect of transporting surface layers of the ocean offshore, allowing the deeper layers to move to the surface. The upwelled water is usually characterized by low temperatures, high salinities, and high nutrient levels. The process increases the primary productivity of surface waters by supporting large phytoplankton blooms. Rich zooplankton and fisheries production ensues.

This general annual sequence varies from year to year depending on global weather conditions. For example, normal oceanographic conditions were significantly disrupted during the 1982-83 El Nino condition that brought abnormally warm waters into the Gulf of the Farallones.



Source Welday and Williams 1975

Gulf of the Farallones National Marine Sanctuary Boundary
Fine Sand
Sand
Basement Outcrops
Mud
Undifferentiated Sand and Mud
Shell Deposits

Figure 3

Sediments

Surface currents in central California are primarily wind driven, leading to seasonal variability in patterns. Water circulation in nearshore waters has been investigated at only a few locations such as Duxbury Reef, Tomales Point, and along the Point Reyes Peninsula. In many of these areas, strong currents produced by wave backwash, tidal currents, and treacherous rip currents have been reported (Minerals Management Service 1983).

Ocean currents can affect resource management in the sanctuary. For example, since currents are poorly understood and often vary from year to year, they are unpredictable and difficult to forecast, an important consideration for predicting oil spill trajectories and for planning oil spill containment measures.

Water Quality and Chemistry

Studies of the nearshore water chemistry of the central California coast acknowledge the lack of data necessary to characterize any specific area. Oceanic water quality along central California generally ranges from very good to high except in areas adjacent to population centers such as San Francisco Bay (Minerals Management Service 1983).

As part of the state and national mussel watch program, mussels *(Mytilus spp.)* in the sanctuary region have been analyzed for selected trace metals (Moss Landing Marine Laboratories) and hydrocarbons (Bodega Bay Marine Laboratory). Kauner, Gordon, and Martin (1979) have conducted trace metal analyses of marine waters from within San Francisco Bay and oceanic waters adjacent to San Francisco Bay. The trace metal levels from water samples within and outside San Francisco Bay were found to be higher than the trace metal levels along the general central-northern California coast. This finding reflects the influence of San Francisco Bay activities on adjacent oceanic waters.

Although vessels discharging their bilges prior to entering the Bay are also thought to be a problem, very little documentation is available to confirm this. Since 1970, there have been regular reports of oil-soaked birds at the Farallon Islands (California State Water Resources Control Board 1979c; Point Reyes Bird Observatory 1985) suggesting that there are frequent offshore releases of hydrocarbons from vessels.

There have been at least two significant accidental oil spills in the vicinity of the sanctuary during the last two decades. Observations made by Chan (1972, 1974) following the 1971 collision and spill of two vessels at the entrance to the Bay indicate that the oil did have at least a temporary effect on intertidal fauna; however, populations did appear to recover to pre-spill levels. The effects on environmental quality of the 1984 T/V *Puerto Rican* spill, and subsequent chronic releases from the vessel's sunken stern are not yet known (U.S. Coast Guard 1985; Chan 1984).

Climate and Weather

The sanctuary is characterized by cool, foggy summers and mild stormy winters. This pattern is controlled by the North Pacific Subtropical High Pressure system. The Pacific High is most dominant in the summer when it is located to the west and north of California. Stable weather therefore persists all summer. Fog is most prevalent during this season as warm air associated with stable atmospheric conditions meets the cold waters at the ocean's surface during the upwelling period. Fog is an important climatic variable since it also maintains low summer temperatures. The lighthouse at the Point Reyes Headland is reported to be one of the foggiest stations on the Pacific coast.

The Pacific Ocean tends to reduce the seasonal temperature range. Measurements taken at the Point Reyes Lighthouse indicate that the daily mean temperatures fluctuate less than 7° F (3.9° C) between the coldest and warmest months of the year (January and September) (Schenk 1970).

Wind patterns reflect the same seasonal variations. The winds during the summer come from the northwest, averaging about 10 to 13 miles per hour (16 to 20 kilometers per hour) at the Lighthouse. During the summer, the prevailing westerlies have a high moisture content, thereby accounting for the persistent fog which often blankets coastal areas north of San Francisco Bay.

(B) Biological Resources

The area was selected and designated as a national marine sanctuary because of concentrations of the following living marine resources: (1) seabirds and aquatic birds; (2) marine mammals (pinnipeds and cetaceans); (3) fish; (4) marine flora (particularly kelp, salt marsh vegetation, and eelgrass); and (5) benthic fauna (U.S. Department of Commerce 1980).

Seabirds

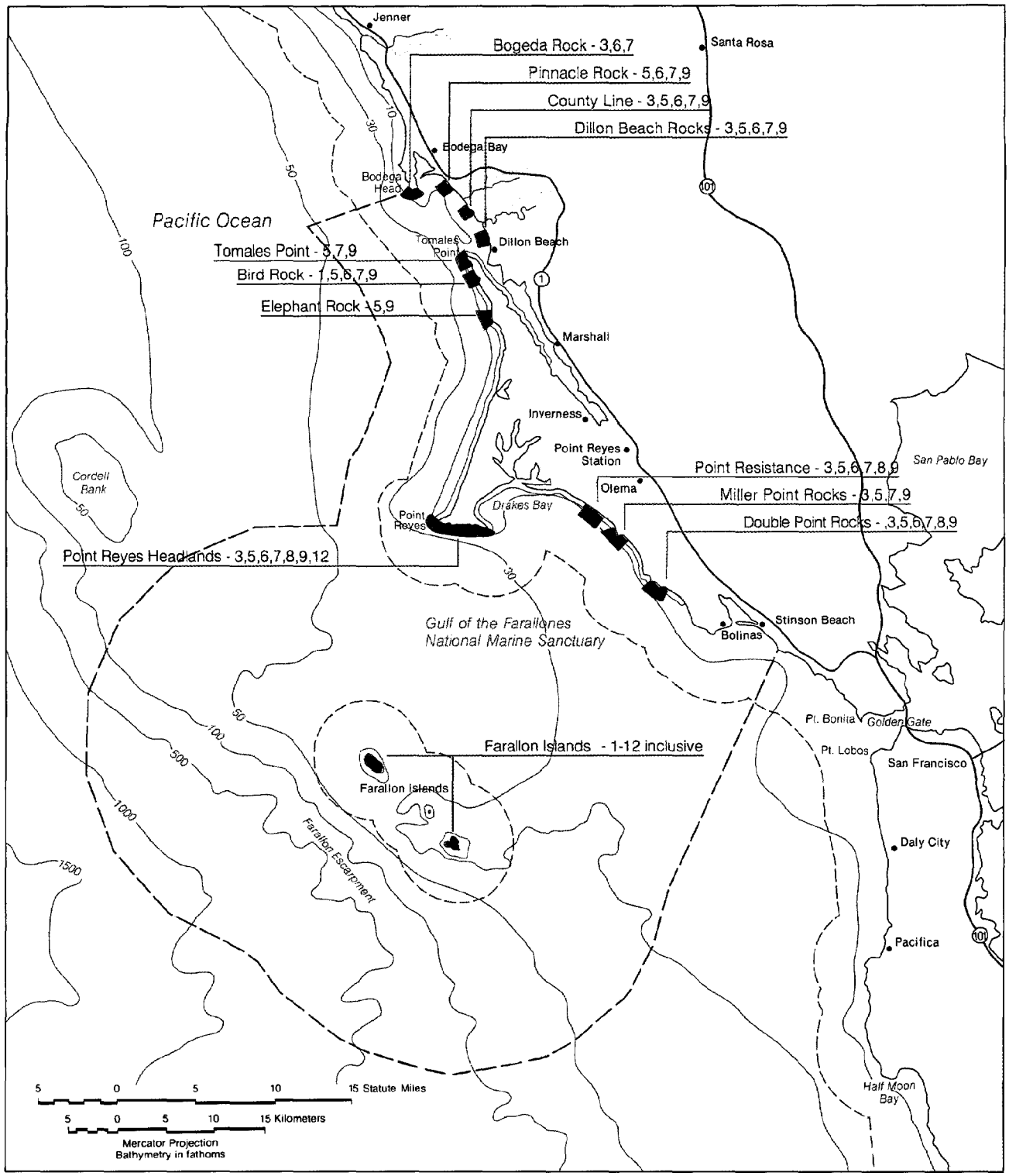
The nesting seabird population is the most significant resource of the sanctuary (see figure 4). The Farallon Islands support the largest concentrations of breeding marine birds in the continental U.S. (Ainley and Lewis 1974). These populations forage in nearshore areas and in the Gulf of Farallones, and are highly dependent on the productive waters of the sanctuary. The area is also noted for its unusually high diversity of its seabird populations. Twelve of the sixteen species of marine birds known to breed along the U.S. Pacific Coast have colonies on the Farallon Islands (Ainley and Lewis 1974) and feed in the sanctuary. These species are:

Ashy storm petrel
Leach's storm petrel
Brandt's cormorant
Double-crested cormorant
Pelagic cormorant
Black oystercatcher
Western gull
Common murre
Pigeon guillemot
Cassin's auklet
Rhinoceros auklet
Tufted puffin

The seabird populations of the sanctuary are not only significant, but fascinating because of their history and long record of exploitation, observation, and study. In a review of the history of the Farallon Islands community, Ainley and Lewis (1974) were able to refer to ornithological observations dating back to the 1850s. The 120 years of records and the ongoing monitoring undertaken by the Point Reyes Bird Observatory since 1972 have allowed scientists to examine the relationship between birds and the ocean with a historical perspective not available in other places along the Pacific coast. The records also indicate the dramatic effects of human-related disturbances on seabirds such as the effects of egg harvesting, the introduction of domestic animals, and oil discharges in nearshore waters (Ainley and Lewis 1974). But the data also indicate the possibility of rapid recovery of seabird populations once disturbances are curtailed. More recently, a sudden decline in the common murre population associated with El Nino has once again shown that seabirds are sensitive to oceanographic events and therefore are good indicators of the dynamics of the ocean ecosystem (Page et al. 1984).

Mainland coastal areas along the edges of the sanctuary support several additional seabird colonies, all considerably smaller than the colonies at the Farallon Islands. Important nesting locations and prominent breeding species are shown in figure 4 (National Oceanic and Atmospheric Administration 1980). Large foraging concentrations of birds occur in the sanctuary in the vicinity of these colonies (see figure 5).

Several current management concerns have been identified that could affect the status of seabird colonies at the Farallon Islands and along the mainland in the next decade. These include conflicts with fishing techniques such as gill-netting (birds diving for prey are caught in nearshore nets). The problems of accidental and chronic discharges of oil and other hydrocarbons associated with the heavy shipping traffic into San Francisco Bay are other concerns. Some chemicals are known to concentrate in the food of seabirds and can affect reproductive success in some species. Disturbances related to human contact and harrassment may continue to be a threat, particularly at the mainland colonies. In relationship to these problems, there is a need to document and understand seabird foraging habits and areas and their relationship to breeding success (Minerals Management Service 1984).



Sources: Sowls, *et al.*, 1981; Ainley, *et al.*, 1982; Point Reyes Bird Observatory, 1985.

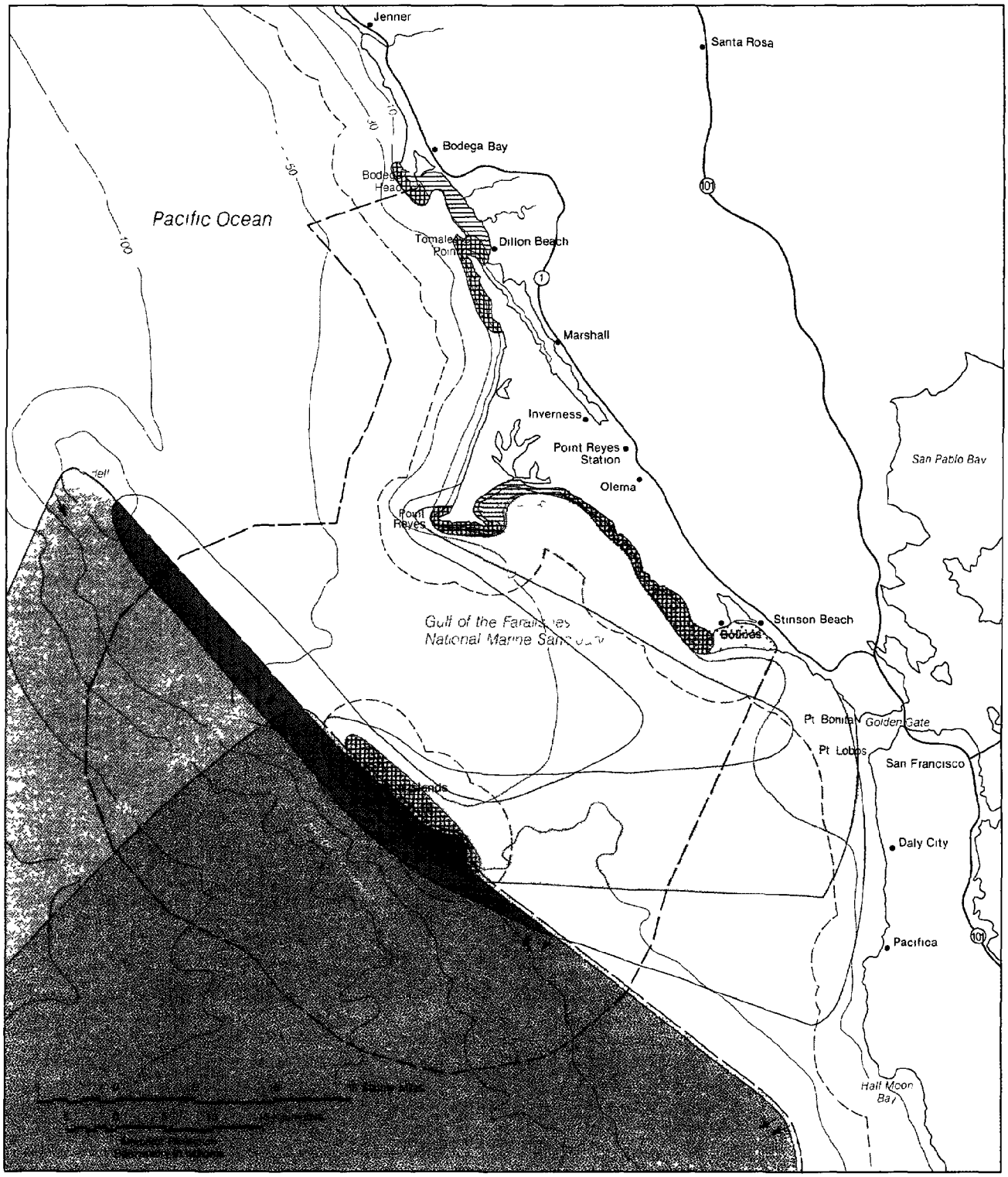
Gulf of the Farallones National Marine Sanctuary Boundary

Nesting Areas

Species
1 Ashy storm petrel
2 Leach's storm petrel
3 Brandt's cormorant
4 Double-crested cormorant
5 Pelagic cormorant
6 Black oystercatcher
7 Western gull
8 Common murre
9 Pigeon guillemot
10 Cassin's auklet
11 Rhinoceros auklet
12 Tufted puffin

Figure 4

Marine Bird Nesting Areas



Source Ainley et al 1982

- Gulf of the Farallones National Marine Sanctuary Boundary
- Rhinoceros auklet
- Cassin's auklet
- Pigeon guillemot
- Western grebe
- Brandt's cormorant
- Pelagic cormorant
- Common murre

Figure 5

Marine Bird Concentrations

Aquatic Birds

Four estuaries, a lagoon, and one large coastal bay within the sanctuary provide foraging habitat for species broadly referred to as aquatic birds (waterfowl, shorebirds, gulls, and terns). These habitats are pristine compared to most coastal wetlands in California and provide relatively remote habitat for thousands of migrant and wintering loons, grebes, pelicans, cormorants, waterfowl, shorebirds, and gulls. There is a large (though incomplete) volume of historical data on the aquatic birds of the sanctuary. An analysis of historical census data by Page et al. (1984) describes the seasonal and temporal distribution patterns of aquatic birds in the sanctuary.

One hundred and twenty-three species of aquatic birds have been recorded in wetland areas of the sanctuary. However, only eight of the species considered abundant or uncommon are reported to breed regularly in coastal areas adjacent to the sanctuary and one additional species breeds irregularly. The breeding species include:

Pied-billed grebe	Mallard	Snowy plover
Great blue heron	Cinnamon teal	Killdeer
Great egret	American coot	Gadwall

In addition to the species that breed and nest in the sanctuary, there are at least twenty species summering in the area, and seven species that are primarily spring and fall migrants. The remaining common aquatic birds have both migratory and/or wintering populations in the sanctuary (Appendix 3). The make-up of the aquatic bird population therefore changes constantly over the course of the year, with new arrivals always overlapping with departures of migratory, overwintering, and breeding species (Page et al. 1984). In addition to the seasonal turnover pattern, Page et al. (1984) report a considerable variability in abundance at a wetland from year to year and a different composition of species at each of the four estuaries studied, making each site a unique community. While the implications of these temporal and spatial patterns have yet to be fully understood, they do suggest how difficult it is to understand fully annual variations and what is involved in monitoring the health of aquatic bird communities in and adjacent to the sanctuary.

The detailed review undertaken by Page et al. (1984) also suggests several concerns and study needs relevant to the protection of aquatic birds. Information on the bird populations of Tomales Bay is lacking. More information is needed on how birds actually use the Bay, and on the numbers of birds present during each season. Other concerns have to do with effects of human disturbance on estuaries such as Bolinas Lagoon and Tomales Bay, and the status of certain species such as the American white pelican, brown pelican, and double-crested cormorant.

Marine Mammals

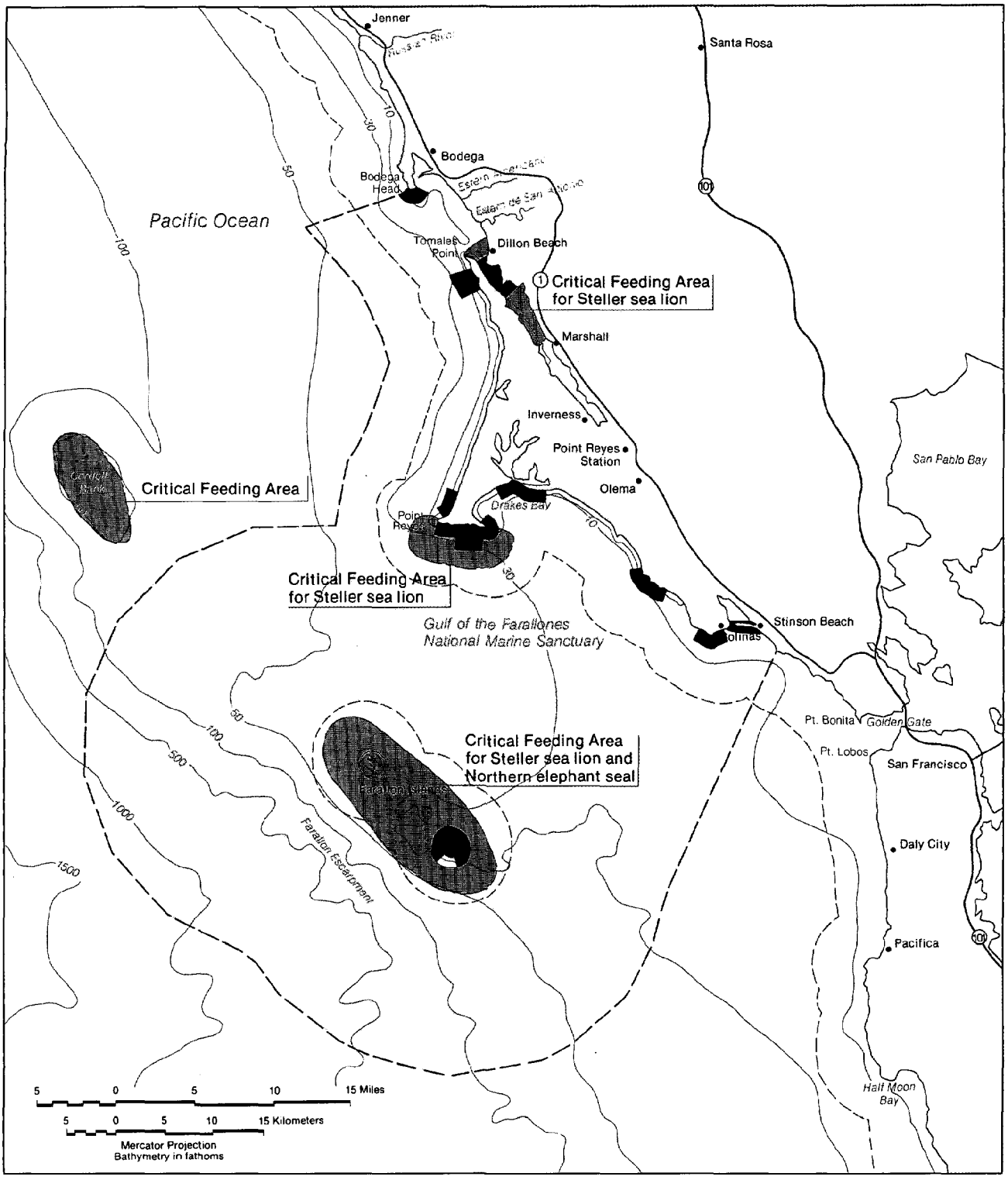
Twenty-two species of marine mammals are regularly observed in the Gulf of the Farallones National Marine Sanctuary: five species of pinnipeds (seals and sea lions) and seventeen species of cetaceans (whales, dolphins, and porpoises). Many of these mammals occur in large concentrations and are dependent on the productive and secluded habitat of the sanctuary and adjacent coastal areas for breeding, pupping, hauling-out, feeding, and resting during migration.

Pinnipeds

The Farallon Islands provide habitat for breeding populations of four species of pinnipeds and the surrounding waters support by far the largest concentrations of California sea lions, northern elephant seals, and northern or steller sea lion within the sanctuary. Harbor seals also breed on the Farallon Islands. A few immature and adult northern fur seals also haul-out every year on Southeast Farallon Island (California State Water Resources Control Board 1979c). The California sea lion and northern elephant seal colonies on the Farallon Islands are the northernmost breeding populations for this species, while the steller sea lion is at the southern end of its range.

Other large concentrations of seals and sea lions are found in the waters surrounding the main rookeries and haul-out sites adjacent to the sanctuary (i.e., Bolinas Lagoon, Double Point, Point Reyes Headlands). Smaller concentrations occur in the vicinity of Bodega Rock, Bird Rock, and Tomales Point (see figure 6).

The California sea lion *(Zalophus californianus)* is the most abundant and widely distributed pinniped of the sanctuary. It is found year-round in the Gulf with approximately 3,000 individuals hauling-out on the Farallon Islands and 300 individuals at the Point Reyes Headlands in August (Ainley et al. 1981). The population in the sanctuary appears to be increasing, a trend also observed in the major breeding range south of Point Conception. Since 1974, one or two pups have also been born on the islands, the northernmost breeding record for this species. About 5,000 to 10,000 animals pass through the Gulf of the Farallones during the spring and fall migrations. A change in migration pattern was first noted at the Farallon Islands in 1978 when large numbers of immature sea lions hauled-out in the fall. Since then the population has tripled, possibly because of the increased availability of Pacific whiting (Allen and Huber 1983; Ainley et al. 1981). California sea lions may also be concentrating along the mainland in December and January to take advantage of seasonally abundant herring spawning in Tomales Bay. Changes in feeding patterns brought on by the El Nino conditions are also expected (Allen and Huber 1983).



Gulf of the Farallones National Marine Sanctuary Boundary

Haul-out Areas

Northern fur seal

Known Critical Feeding Areas

Breeding and Haul-out Areas

Northern elephant seal

California sea lion

Steller sea lion

Harbor seal

Figure 6

Pinnipeds

Steller sea lions *(Eumetopias jubatus)* occur year-round throughout the sanctuary, especially in the coastal waters of the Farallon Islands. Unlike the California sea lion, the steller sea lion population has decreased dramatically in the southern part of its range which includes the Farallon Islands. The reasons for this decline are not understood and may involve a combination of factors such as increased competition from other pinnipeds, a general warming trend in water temperature resulting in decreased prey availability, and a depressed reproductive rate (Allen and Huber 1983). The breeding population at the Farallon Islands has remained constant at about 130 to 190 animals, and 12 pups were born in 1982. Much smaller numbers (less than 20) have been recently recorded hauling-out along the mainland. The population appears to have a very low birth rate and a very high rate of premature pupping. This could be caused by disease, increased levels of chlorinated hydrocarbons in tissues, or a combination of factors (Huber 1984).

The northern elephant seal *(Mirounga angustirostris)* is the largest and second most abundant pinniped in the sanctuary. The total breeding population in the sanctuary (primarily at the Farallon Islands) is about 900 individuals, a dramatic increase since the early 1970s when the population numbered less than 200 individuals (California State Water Resources Control Board 1979c). The population may also be expanding its range to the Point Reyes Headlands area, where several individuals have been sighted.

A few northern fur seals *(Callorhinus ursinus)* are regularly sighted on the north Farallon Islands from June to September. Fur seals probably bred on the islands before the fur seal harvesting of the nineteenth century. The species now breeds almost exclusively on the Pribilof Islands in Alaska, although a small colony has established itself on San Miguel Island in the Channel Islands (DeMaster 1984; California State Water Resources Control Board 1979c).

Thousands of female and immature fur seals migrate through the western edge of the sanctuary along the continental shelf from November through June (Ainley et al. 1981). Of all the marine mammals in the sanctuary, northern fur seals are the most sensitive to an accidental oil spill because they depend largely on their fur for insulation.

Harbor seals *(Phoca vitulina)* haul-out and breed at the Farallon Islands and at sites adjacent to the sanctuary such as Double Point, Tomales Point, Drakes Estero. Double Point is the largest harbor seal pupping ground in California (Allen and Huber 1983). Combined with the seals utilizing Drakes Estero, Tomales Point, and Tomales Bay, the Point Reyes population represents a significant proportion (17 percent) of the state harbor seal population estimated to be 19,000 in 1982 (Allen and Huber 1983). Observations at Double Point and Bolinas Lagoon suggest that on a local level, there has been an expansion in harbor seal use of these areas during the breeding season (Allen and Huber 1983). A large number of seals appear to migrate from unknown areas to the sanctuary to breed. Seals are possibly attracted by suitable habitat, food availability, and lack of human disturbances. There is a need for information about movements outside the sanctuary to understand where breeding animals disperse in summer and winter (Allen and Huber 1983).

In summary, the significance of the pinniped resources of the sanctuary is determined primarily by the following characteristics:

- It is one of the few areas of the world with an overlap in distribution of species characteristic of warm-temperate waters (i.e., California sea lion) and cold temperate waters (northern fur seal; steller sea lion).
- The rookeries for several species have been expanding in recent years and further growth is expected.
- For some species, the sanctuary population represents a high percentage of either the central California population or the state's total population.

- Sanctuary waters are highly productive to support such a large and rapidly growing mammal population.
- The populations are relatively accessible to major urban centers, providing opportunities for research and interpretation as well as creating potential conflicts with visitors.

While the status of pinnipeds is well documented, several questions remain with respect to their ecology and behavior. These questions may affect how pinnipeds can be protected in the sanctuary. Several management and research concerns are being jointly addressed by organizations such as the Marine Estuarine Management Division, the National Marine Fisheries Service, and the California Department of Fish and Game. These include: (1) the nature and extent of interactions between pinnipeds and several net fisheries; (2) the effects of oil spills and chronic pollution on individuals and populations; (3) food requirements of pinniped populations and their implications for fisheries management; (4) the need to minimize existing and future levels of human disturbance; and (5) the spatial/geographic distribution of various life history functions of the pinniped populations (e.g., breeding, hauling-out, feeding, foraging, pupping.)

Cetaceans

Seventeen species of whales and dolphins have been sighted in the sanctuary. Ten species are seen regularly and of these, the killer whale, minke whale, harbor porpoise, Dall's porpoise, and white-sided dolphin are considered year-round "residents." The harbor porpoise is the most abundant small cetacean in the Gulf of the Farallones, but the size of the population is not precisely known. Very little is known concerning the areas of concentration, life history, or behavior of the other resident populations within the sanctuary.

The status of the sanctuary's harbor porpoise population is a complex issue of regional and national concern (DeMaster, pers. comm.; Marine Mammal Commission 1985). Although precise estimates of the number of harbor porpoises taken in gill nets in central California are not available, observations in the sanctuary indicate that at least 100 animals were taken in 1983 (Ainley, pers. comm.). This estimate is conservative, but scientists believe that even this known level of take is considerably above the maximum allowable take the population can withstand (DeMaster, pers. comm.).

The sanctuary also lies on the migratory pathway of the gray whale and other large baleen and toothed whales (see figure 7). Gray whales migrate from Alaska southward through the sanctuary beginning in December with peak migration in January. The northward migration begins at the end of February and peaks in March (Ainley et al. 1978). A small number of gray whales remain near the Farallon Islands during the summer, suggesting that these may be an over-summering population. Furthermore, an increasing number of humpback whales have been sighted in the Gulf between April and November, indicating the return of a seasonal population that had been eliminated by the whaling industry in the early 1900s. Cetaceans are considered a significant sanctuary resource because of the frequency and diversity of sightings within the site, and the fact that the world's total cetacean populations are so small.

In summary, important management concerns for cetaceans in the sanctuary include

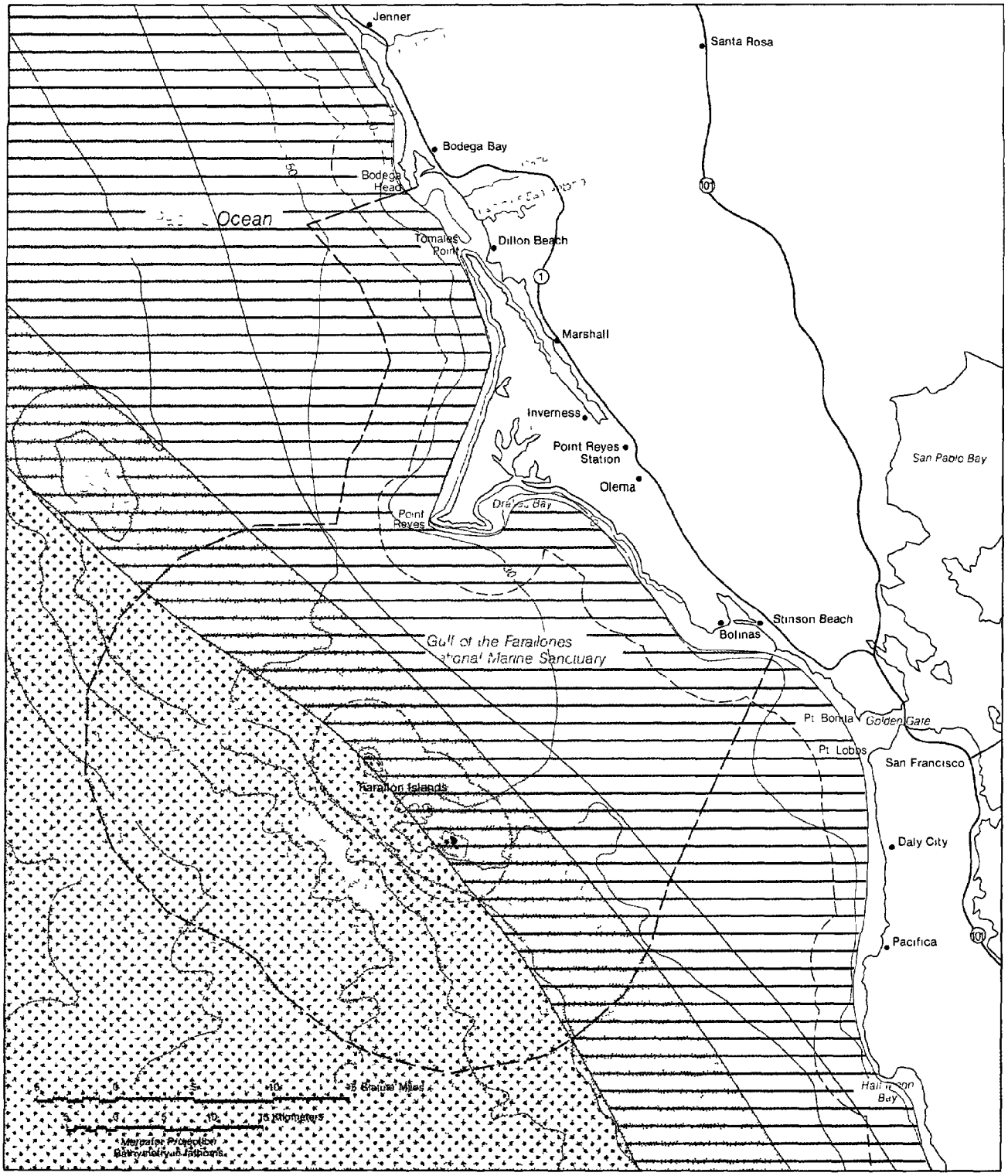
- Lack of baseline data on the status of populations
- Interactions of the smaller species, such as the harbor porpoise, with commercial gill net fisheries
- Humpback whale ecology and factors involved in the return of this population to the sanctuary area

Invertebrates, Fish, and Marine Plants

There is a diversity and abundance of fish and invertebrate species within the sanctuary. This is due largely to the variety of habitats within the sanctuary. According to a recent review by Chan (1984), the sanctuary's marine fauna may in fact be more diverse than in other areas along the Pacific Coast because of the unusual mixture of soft shale (Duxbury Reef) and hard shale (Estero de San Antonio) alternating with both small and large estuaries and lagoons.

Our understanding of the fish and invertebrate communities is far from complete. A few surveys undertaken to date provide an indication of some of the characteristic species (California State Water Resources Control Board 1979a, 1979b, 1979c). The most complete records are available for the intertidal and nearshore zones with only sketchy information on fauna beyond 100-foot depths. This scarcity of information is due in part to the difficulty of sampling at depths and the hazardous diving conditions (Chan 1984). The life histories and seasonal distribution of commercially important species such as the Pacific salmon and Dungeness crab are better documented than those of species with limited or no commercial value.

The protected bays and coastal wetlands of the sanctuary include intertidal mudflats, sand flats, salt marshes, a few submerged rocky terraces, and shallow subtidal areas. The intertidal mudflats support large concentrations of burrowing organisms (clams, snails, crabs) that are a main food source for shorebirds and waders. Some species (such as the littleneck clam) are also collected by recreational fishermen. Eelgrass beds occur on the more extensive flats at Tomales Bay (see figure 8) and they support other assemblages of organisms living on the blades, about the bases, and among the roots of the plants. Eelgrass is also critical for the remnant population of black brant which



Source Ainley et al 1982

Gulf of the Farallones National Marine Sanctuary Boundary

Areas of Concentration

Dall's porpoise

Areas of Occurrence

Humpback whale

Blue, Fin Sperm whales

Gray whale and Harbor porpoise

Figure 7

Cetaceans

winters within the sanctuary and the adjacent Point Reyes National Seashore. Pacific herring also use eelgrass beds for spawning in Tomales Bay. The shallow protected waters of the bays and estuaries are also critical habitat for anadromous fish, several species of surfperches, and flatfish (California Department of Fish and Game 1980).

Very different species are found along the exposed rocky coasts of the sanctuary, such as Duxbury Reef. Chan (1984) provides a detailed description of the zonation of rocky benthic communities. In a typical transect, barnacles and limpets in the high tide zone (Zone 1) are gradually replaced by black turban snails (Zone 2), sea mussels (Zone 3), and the sea anemones and urchins that mark the transition (Zone 4) toward subtidal rocky communities.

Over shallow rocky reefs where light, temperature, and other sea conditions are suitable, dense kelp beds occur (see figure 8). These beds are dominated by bull kelp and to a lesser extent by giant kelp. Kelp beds extend along the mainland coast between Point Reyes Headlands and Bolinas Lagoon and on the leeward side of the Farallon Islands. Many other species of algae *(Pterygophora, Botryoglossum)* grow under the kelp canopy. The fronds, stipes, and holdfasts provide accessible habitat for pelagic and demersal finfish and protection for juvenile finfish.

Sandy shores and shallow sandy bottoms provide another habitat prevalent in the sanctuary (California Department of Fish and Game 1979). Except in very calm shallow coves, sandy substrates do not support extensive algal growth. Fish and invertebrate species tend to be less diverse and abundant in this habitat than in rocky bottom areas. Common species include Dungeness crab, ocean shrimp, surfperch, starry flounder, sand sole, smoothhound shark, and white croaker (California Department of Fish and Game 1979).

Accurate characterizations of the deeper subtidal habitats of the sanctuary are limited (California Department of Fish and Game 1979). Deep rocky reefs are not as easily observed as the shallow reefs which are more accessible to scuba divers and therefore have been more extensively studied. At depths of about 10 or 13 fathoms, the lack of adequate light penetration limits kelp growth. Encrusting coralline algae, brittle stars, and serpulid worms are among the life forms found. Rocky banks in water over 30 fathoms are inhabited mostly by rockfishes, often in large populations. Chilipepper, bocaccio, stripetail rockfish, squarespot rockfish, speckled rockfish, widow rockfish, greenstriped rockfish, greenspotted rockfish, yellowtail rockfish, and several others are found here as well as an occasional lingcod, sablefish, or cabezon. Rock sole, Dover sole, English sole, Pacific sandab, petrale sole, and sablefish are found in offshore soft bottoms. Over 20 species of fish are also common to the pelagic environment of the sanctuary, including several large predators such as King salmon, numerous shark species, silver salmon, albacore, Pacific bonito, jack mackerel, Pacific mackerel, and others. Concentrations of pelagic schooling species such as northern anchovy and Pacific herring are a critical food source for predator species such as pinnipeds and the brown pelican.

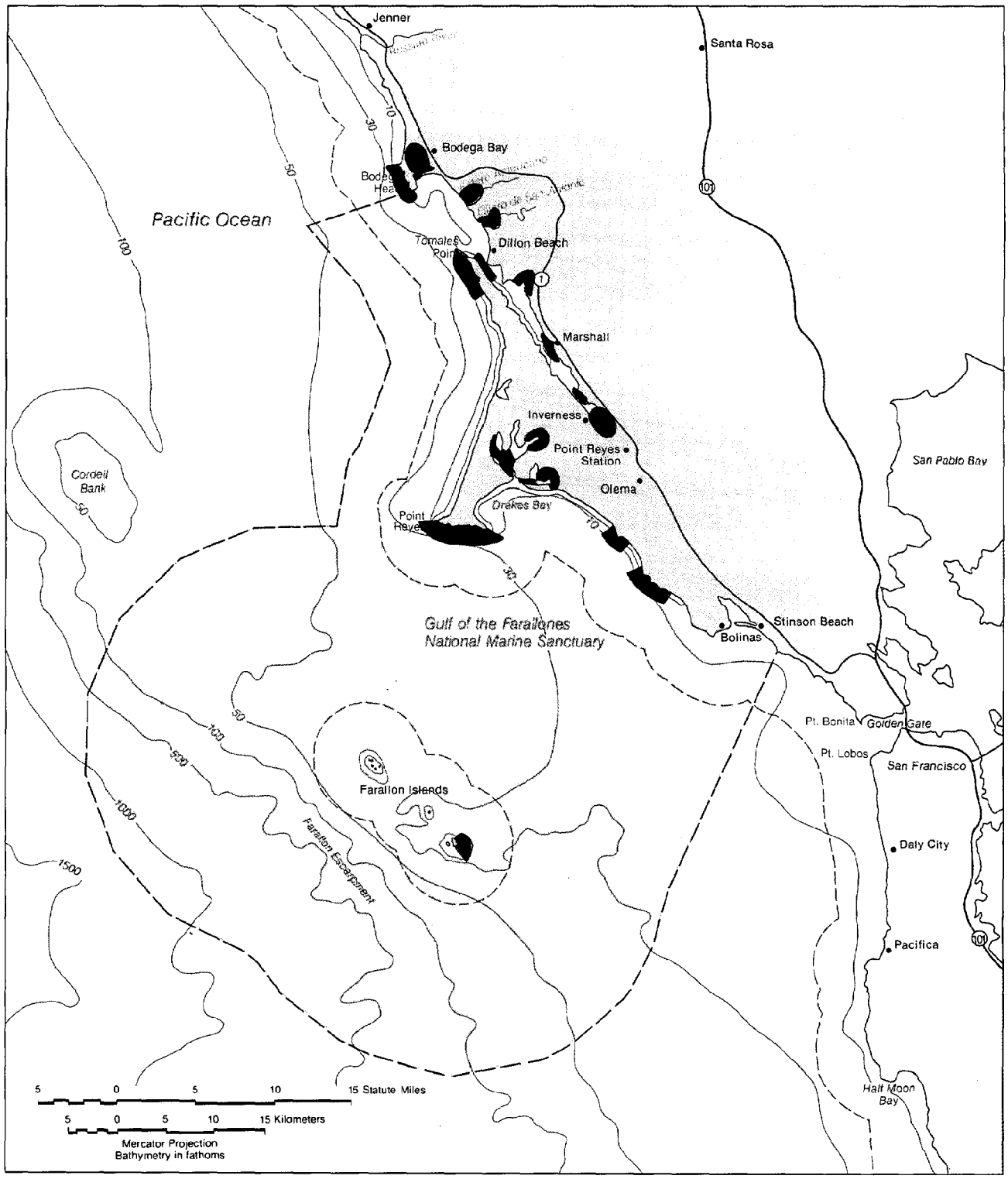
Current knowledge and understanding of fish in the sanctuary come from the California Department of Fish and Game's management of commercial and sport species. Immediate management concerns center on depleted stocks, particularly for species with slow recruitment rates, and on the protection of critical spawning and nursery habitats. Vulnerable habitats in the sanctuary also need to be identified.

Intertidal areas have been relatively well documented periodically over the past two decades. However, because of the lack of a long-term data base, the dynamics of these areas are not easily understood. Chan (1984) points out the need for continuous monitoring of benthic invertebrates as a baseline against which to evaluate impacts of events like oil spills. There is also a need to understand natural factors of change (such as El Nino effects) separate from human-induced disturbances. Some intertidal species such as abalone are still illegally harvested at certain locations. The effects of illegal take and trampling of intertidal habitats need further investigation. Intertidal areas within the sanctuary have also been quarantined, and there is a need to monitor the level of contamination and its effects through the food chain.

So little is known about the status of subtidal invertebrates in the sanctuary that it is not possible to determine immediate management issues. The most immediate need may be to assess that status of knowledge of various subtidal communities within the sanctuary in collaboration with the California Department of Fish and Game and local research organizations. There may also be an opportunity to set aside certain rocky, subtidal areas that can be isolated for study purposes with no human disturbance.

(C) Cultural and Historic Resources

Archaeological and historical investigations in areas outside the sanctuary have uncovered evidence that significant submerged cultural resources may be present within the sanctuary (Murphy 1984). Over 100 onshore archaeological sites have been recorded adjacent to the sanctuary in locations such as Tomales Point, Double Point, and Drakes Estero. These sites illustrate the complete story of northern California Indians from prehistory, through European contact, to recent times. They provide clues to how native communities such as the Coast Miwok people depended on a wide range of marine resources for subsistence and trade. Onshore historic



Sources: California Department of Fish and Game, 1980; U.S. Fish and Wildlife Service, 1981.

Figure 8

Marine and Coastal Plants

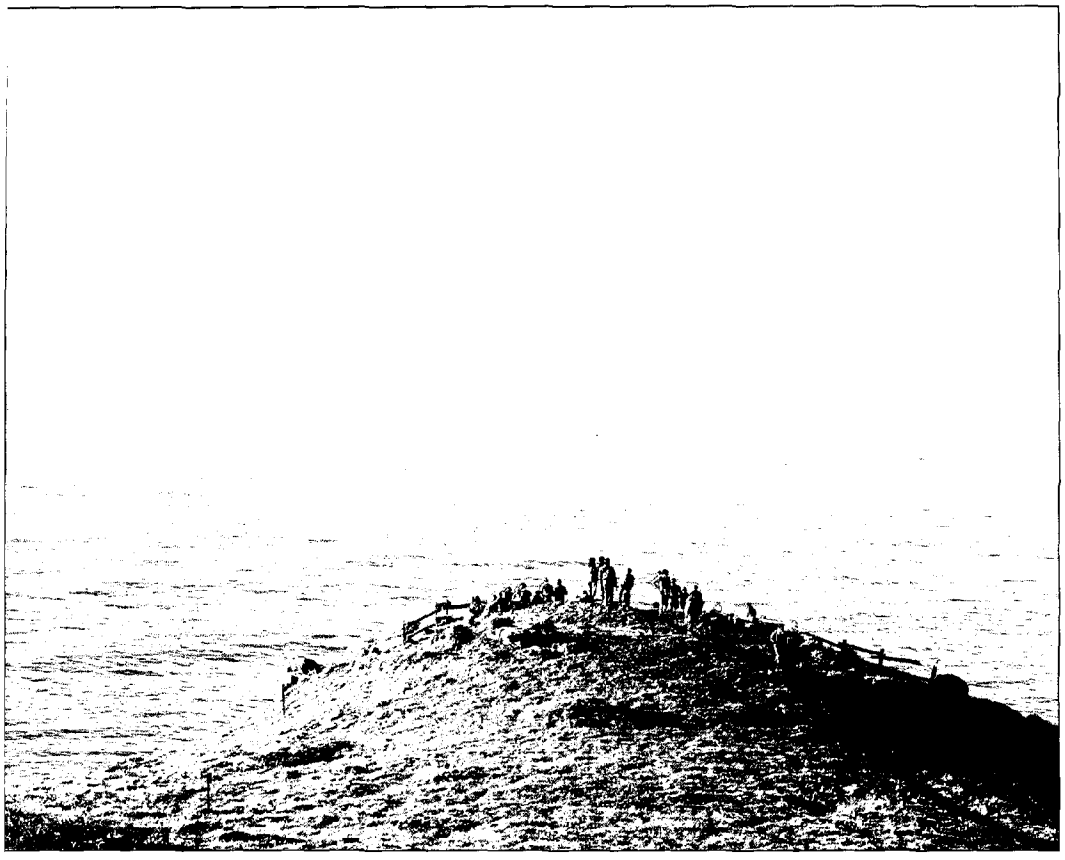
sites adjacent to the sanctuary (e.g., the Point Reyes and Point Bonita Lighthouses) document the strategic importance of San Francisco Bay, the Farallon Islands, and the Gulf of the Farallones during the Spanish exploration and fur trading eras.

Point Reyes and Drakes Bay were important in the early historical development of the San Francisco region and consequently were the location of numerous shipwrecks. The earliest wreck dates back to 1595 when the Spanish Manila Galleon *San Agustin* sank in Drakes Bay. There are at least 72 other marine disasters recorded between 1840 and 1940, resulting in at least 30 wrecks in the area, with 15 in Drakes Bay or near the Point Reyes Headlands (Murphy 1984).

Recent investigations undertaken by NOAA and the National Park Service in 1982-83 were aimed at locating shipwreck sites in pre-selected portions of Drakes Bay and the remains of the *San Agustin* (Carrell 1984; Murphy 1984). The on-site investigations confirmed the extent and location of potential wreck sites within the Bay and a few wrecks were located and inventoried, but the exact location of the *San Agustin* remains a mystery. A considerable amount of fieldwork (involving hazardous diving conditions) is still required to identify and evaluate the significance of the sanctuary's submerged cultural resource.

SANCTUARY USES

The sanctuary supports educational, scientific, recreational, and commercial uses, many of which depend on the area's unique environment and abundant resources. The multiple use character of the sanctuary contributes to its significance and is an important consideration for this management plan. The National Marine Sanctuary Program is also strongly committed to the concept of compatible multiple uses in national marine sanctuaries as long as the purposes for which the sanctuary was established are maintained. Uses in various parts of the sanctuary are discussed below.



(A) Recreation

The waters and adjacent shoreline of the sanctuary host a variety of recreational activities. By far, most of the visitor use related to the sanctuary is concentrated in adjacent coastal areas, particularly at the main access points distributed along the 100 miles of shoreline. Many of these access points offer services and facilities for both day and overnight use of coastal and nearshore areas.

Sport fishing involves the largest number of recreational users in both nearshore and off-shore waters of the sanctuary (California Department of Fish and Game (1979). Figure 9 shows the distribution of the main sport fishing areas within the sanctuary. Partyboats operate

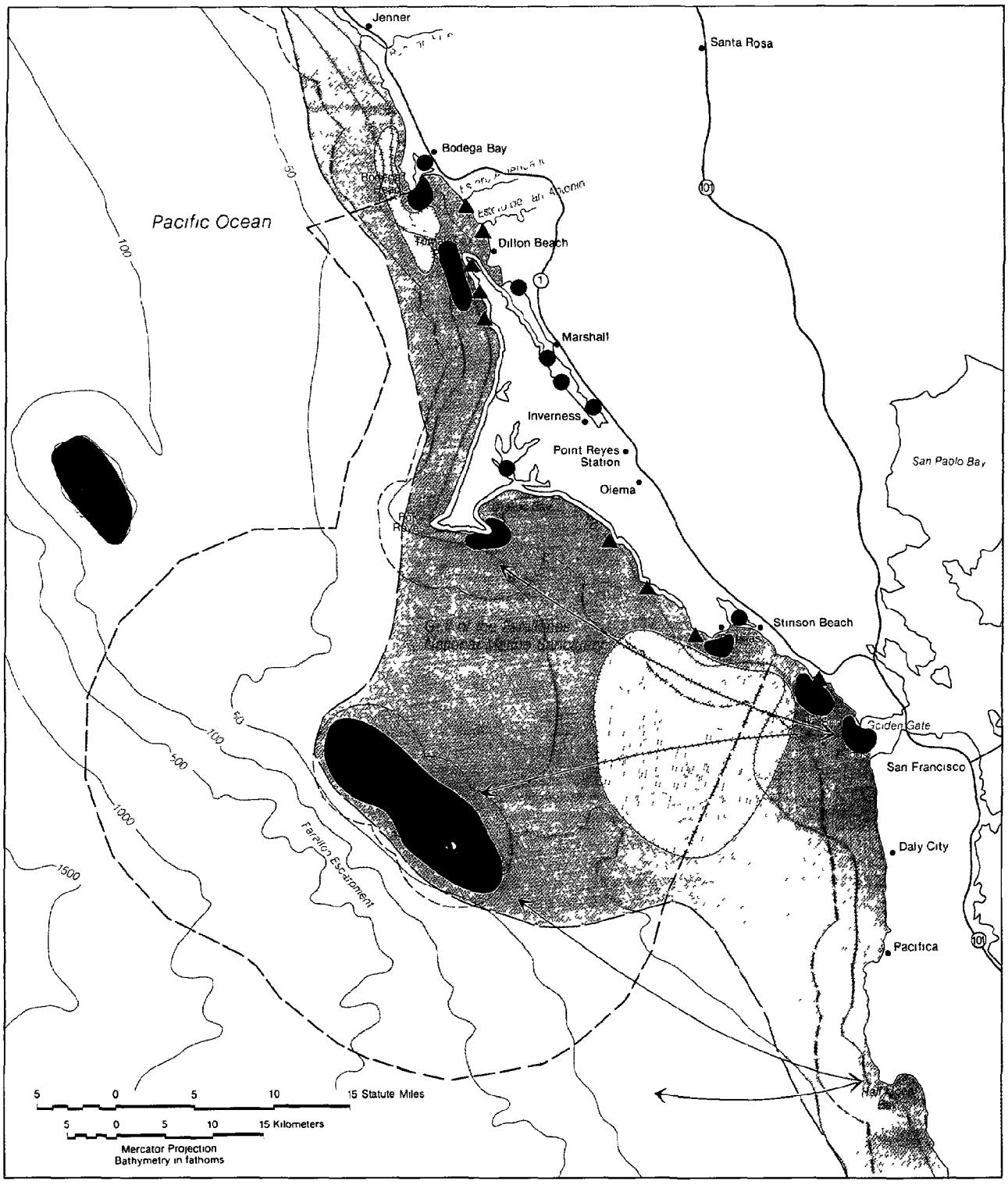
from San Francisco, Oakland, Alameda, Berkeley, Richmond, Bodega Bay, Half Moon Bay, and Sausalito. King salmon, rockfish, and striped bass are the major species taken by trawlers. The sanctuary may account for the state's largest salmon partyboat fishery (out of San Francisco Bay). Bodega Bay and Duxbury Reef are among the most popular areas for rockfishing in the sanctuary. Waters around the Farallon Islands are also used for rockfishing.

Whale watching, Farallon Island trips, and pelagic birding excursions organized by Oceanic Society Expeditions, the Whale Center, and other environmental education groups account for several thousands of visitors venturing offshore. The popularity of such cruises in the Gulf of the Farallones has been increasing since 1980. Sailing and power boat clubs in San Francisco Bay sponsor ocean races at various times throughout the year which often utilize the Farallon Islands as a turning point (NOAA 1980; NOAA 1984c).

The predominant onshore recreational uses (most of which occur along the shore adjacent to the sanctuary) are: beach-related activities; coastal hiking; nature observation; tidepooling; surfing and windsurfing; clamming and abalone diving; surf fishing; and duck hunting (California Department of Fish and Game 1979; NOAA 1984c).

Beach-related activities account for the largest numbers of visitors to the adjacent shore. Over 1.8 million visitors were reported in 1983 at the most popular beaches including Stinson Beach (GGNRA), Muir Beach (GGNRA), Drakes Beach (PRNS), Limantour Beach (PRNS), and McClures Beach (PRNS) (NOAA 1984c). The high levels of attendance each year, particularly at the height of season, make these areas appropriate places for visitor contact programs. There is an opportunity to make the general public aware of the sanctuary, its resources, uses, and management objectives.

Several onshore locations adjacent to the sanctuary have become popular in recent years for both whale-watching and birding. As many as 145,000 visitors were reported at the Point Reyes Lighthouse observing whales from shore during their northward and southward migrations between December 1984 and March 1985 (Pugh, pers. comm.). Large numbers of bird-watchers spend time along the sanctuary's coastal wetlands observing shorebirds, waders, and waterfowl. Popular locations are Bolinas Lagoon and Tomales Bay salt marshes in the sanctuary, and Limantour Estero and Abbotts Lagoon in adjacent areas. Birding excursions and field seminars organized by the Point Reyes Bird Observatory, the Oceanic Society, the Point Reyes Field Seminars and others initiate visitors and school groups to the bird resources of the sanctuary.



Sources: California Department of Fish and Game 1980
Minerals Management Service 1981

- Gulf of the Farallones National Marine Sanctuary Boundary
- Rockfishing
- Abalone and Tidepooling
- General Salmon Trolling Area
- Prime Salmon Trolling Area
- Clam Digging
- Bird and Whale Watching Excursions
- Island Excursions

Figure 9

Sportfishing and Marine Recreation

A recent survey of intertidal users within the sanctuary indicate that in excess of 2,000 tidepoolers use Duxbury Reef every year (Chan 1984). A certain percentage of these users are illegally taking mussels, black turban snails, and limpets and some parts of the reef have been seriously depleted of these species. Abalone diving occurs mainly along Tomales Point where the granitic rocks provide good visibility for divers and sufficient legal-sized specimens are available for lowtide rockpickers (Chan 1984). Based on the most recent surveys, an increasing number of hunters were crossing over to the Tomales Point on a single weekend to collect abalone in the rocky reefs during spring and summer low tides. The effect of the heavy harvest on the abalone population, the impact on the overall nearshore community, and the extent of illegal take are not known.

Clams are harvested in the estuaries and along some beaches within the sanctuary and are the object of a popular sport fishery. Gaper, Washington, and littleneck clams are commonly taken from Tomales Bay at Lawson's Landing and Tomales Bay State Park, Bodega Bay, and Bolinas Beach (see figure 9). There may be more than 1,000 clam diggers in these areas on weekends (California Department of Fish and Game 1979, 1980).

The shoreline adjacent to the sanctuary lends itself to a variety of shore-fishing methods such as surf (line) fishing, surf-netting, and poke poling. Popular locations include the area between Dillon Beach and Estero de San Antonio (California Department of Fish and Game 1979). Duck hunting is another recreational activity that attracts more than 1,000 sportsmen each year to the Tomales Bay saltmarshes and ponds.

Total estimates of onshore visitor use are difficult to make given the large number of coastal access points and the wide variety of recreational activities that occur along the edges of the sanctuary. Available data do, however, indicate that a large percentage of the onshore use is concentrated in a few locations and that the seasonal distribution of people and activities varies widely. These patterns, when better understood, should indicate the best locations for coastal interpretive activities.

Existing recreational activities are relevant to sanctuary management since they offer opportunities to inform relatively large and interested user groups about the sanctuary. To some extent, visitors represent the potential demand for sanctuary interpretive programs. With the apparent lack of consolidated statistics concerning visitor use, an important priority recognized by the Sanctuary Programs Division has been to contact the large organizations that may be keeping visitor use records in order to ascertain current participation in recreational activities in the sanctuary (NOAA 1984c).

Other issues related to recreational use of the sanctuary include the visitor use/resource relationships particularly where an adverse effect is suspected. This concern has led to the funding of selected impact studies and monitoring programs within the sanctuary. Another concern is understanding the economic benefits of the sanctuary (both market and non-market values) to the regional and national economies.

(B) Commercial Fishing and Mariculture

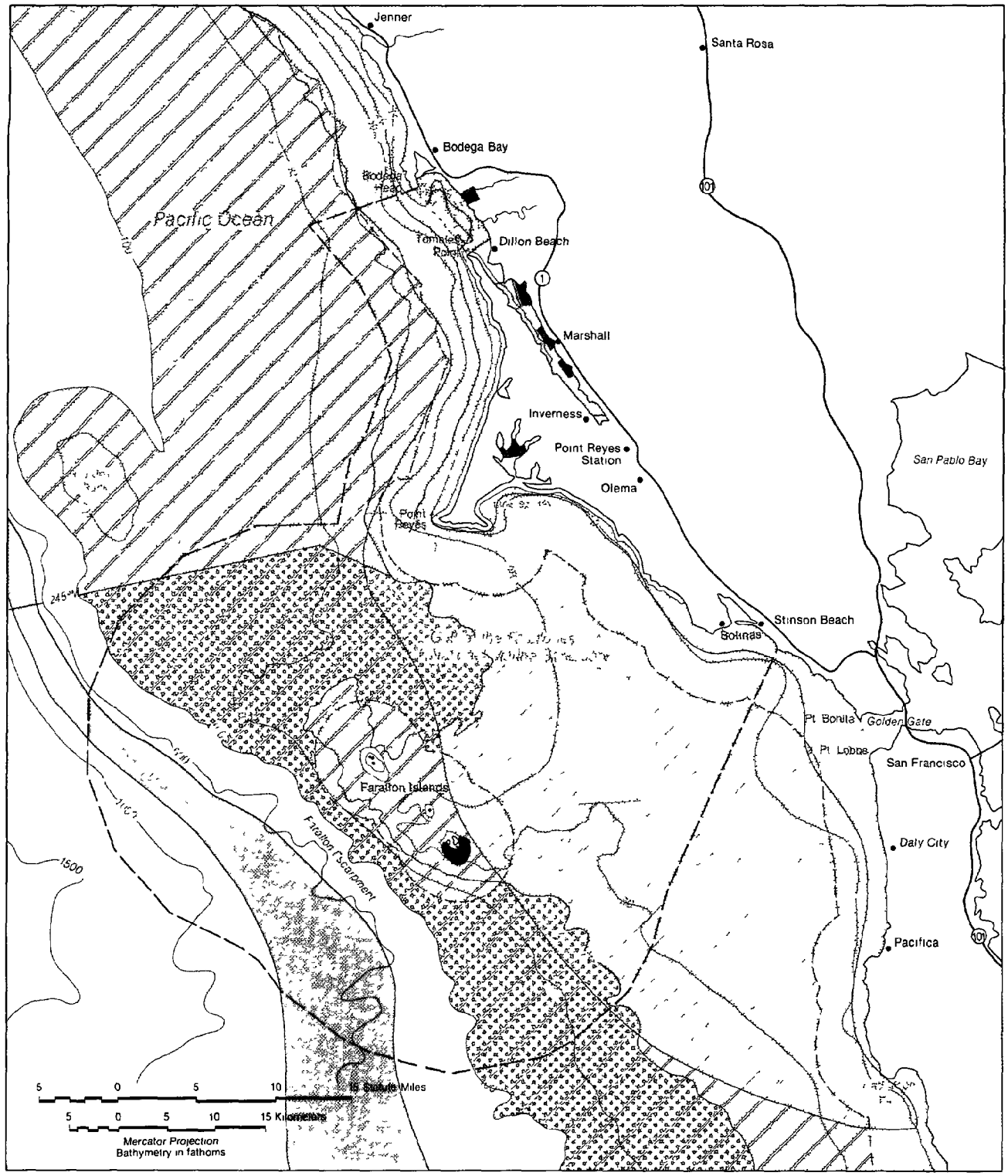
The abundant resources of the sanctuary support several large year-round and seasonal fisheries. The more important commercial harvests of the sanctuary, based on dollar value, are:

Pacific herring (January-March)
Salmon trolling (April-September)
Rockfish (year-round)
Other bottom trawl fishery (sole, halibut, flounder) (year-round)
Albacore tuna (August-October)
Dungeness crab (November-June)

Most of the commercial catch harvested in the sanctuary is landed at San Francisco, Bodega Bay, Oakland, Half Moon Bay, and Sausalito. Small volumes are also landed at Tomales Bay, Point Reyes, Marshall, and Dillon Beach (California Department of Fish and Game 1981). The commercial salmon trolling fishery extends along Bodega Bay, the Point Reyes Peninsula, Drakes Bay, and further south (see figure 10). Dungeness crabs are also taken commercially within nearshore waters in Bodega Bay and Drakes Bay. A commercial gillnet fishery for Pacific herring occurs within Tomales Bay. Several pelagic and bottom fisheries occur throughout the Gulf of the Farallones (California Department of Fish and Game 1980) (see figure 10).

In addition to conventional commercial fishing ventures, mariculture operations also occur in the area within Tomales Bay, Estero Americano, and Drakes Estero. A number of private organizations lease tracts from the California Department of Fish and Game to produce oysters (see figure 10).

Fisheries within the Gulf of the Farallones are very productive due in part to the presence of a variety of habitats important to commercially valuable species such as Dungeness crab, Pacific herring, and rockfish. These habitats provide nurseries and spawning grounds for these species, although only limited knowledge of their use is currently available. One management concern is understanding the role of these areas and how to maintain sustainable harvests within the sanctuary.



Source: California Department of Fish and Game 1980 Kucera pers comm 1986

- Gulf of the Farallones National Marine Sanctuary Boundary
- Salmon Trolling Fishery
- Sablefish Trap Fishery
- Mariculture Operations
- Dungeness crab
- Bottom Trawling Fishery
- Pacific herring Gillnet Fishery
- Gill and Trammel Net Fishery
- Commercial Abalone Fishery

Figure 10

Commercial Fishing and Mariculture

(C) Shipping and Other Marine Activities

The sanctuary lies immediately westward of the entrance to San Francisco Bay. Three major shipping lanes approaching San Francisco converge near the sanctuary in a circular precautionary zone 11.9 nautical miles in diameter, lying outside the Golden Gate entrance (see figure 11).

The total volume of traffic in and out of San Francisco Bay is large. A total of 3,781 vessels arrived at the Bay in calendar year 1981. This represents an average of three tankers and seven other types of vessels (i.e., cargo, passenger) per day that entered the Bay during 1981. The total number of vessels arriving in the Bay has declined about 28 percent since 1968, when there were 5,218 vessel arrivals (Minerals Management Service 1983).

The U.S. Coast Guard (Twelfth and Eleventh Districts) has recently completed studies of the potential traffic density and the need for safe access routes offshore California. Based on the most recent recommendations, the San Francisco Traffic Separation System would be retained with northern, western, and southern approaches. The northern and southern lanes would be realigned and the southern lanes lengthened. A shipping safety fairway would lie over the Precautionary Area and each of the traffic lanes.

Other offshore commercial and industrial activities within the sanctuary are limited. No oil and gas development activities occur within the sanctuary. In 1963, 57 tracts were leased in the area between Russian River and Bolinas. After unsuccessful exploratory drilling, these tracts were later abandoned (Minerals Management Service 1982).

In 1970, the California state legislature established oil and gas sanctuaries which prohibited hydrocarbon development in state waters along Sonoma, Marin, and San Francisco counties. These prohibitions expired in 1975, and leasing could now occur in state waters, although this appears unlikely. Within Federal waters, the 1978 Outer Continental Shelf (OCS) Lands Act Amendments prohibit any exploration or development within 15 miles of the boundaries of the Point Reyes Wilderness Area unless California issues a permit for such activities in state waters (Minerals Management Service 1983) (see figure 11).

The draft Five-Year OCS Oil and Gas Leasing Program proposed by the Department of the Interior (MMS 1986) estimates that a lease sale will take place in the central California offshore area outside the sanctuary in May of 1989. It is estimated that from this proposed sale, 11 exploration wells will be drilled and that resources totalling 207 million barrels of oil and 292 billion cubic feet of gas will be produced from 30 production wells from 1 platform (Minerals Management Service 1986).

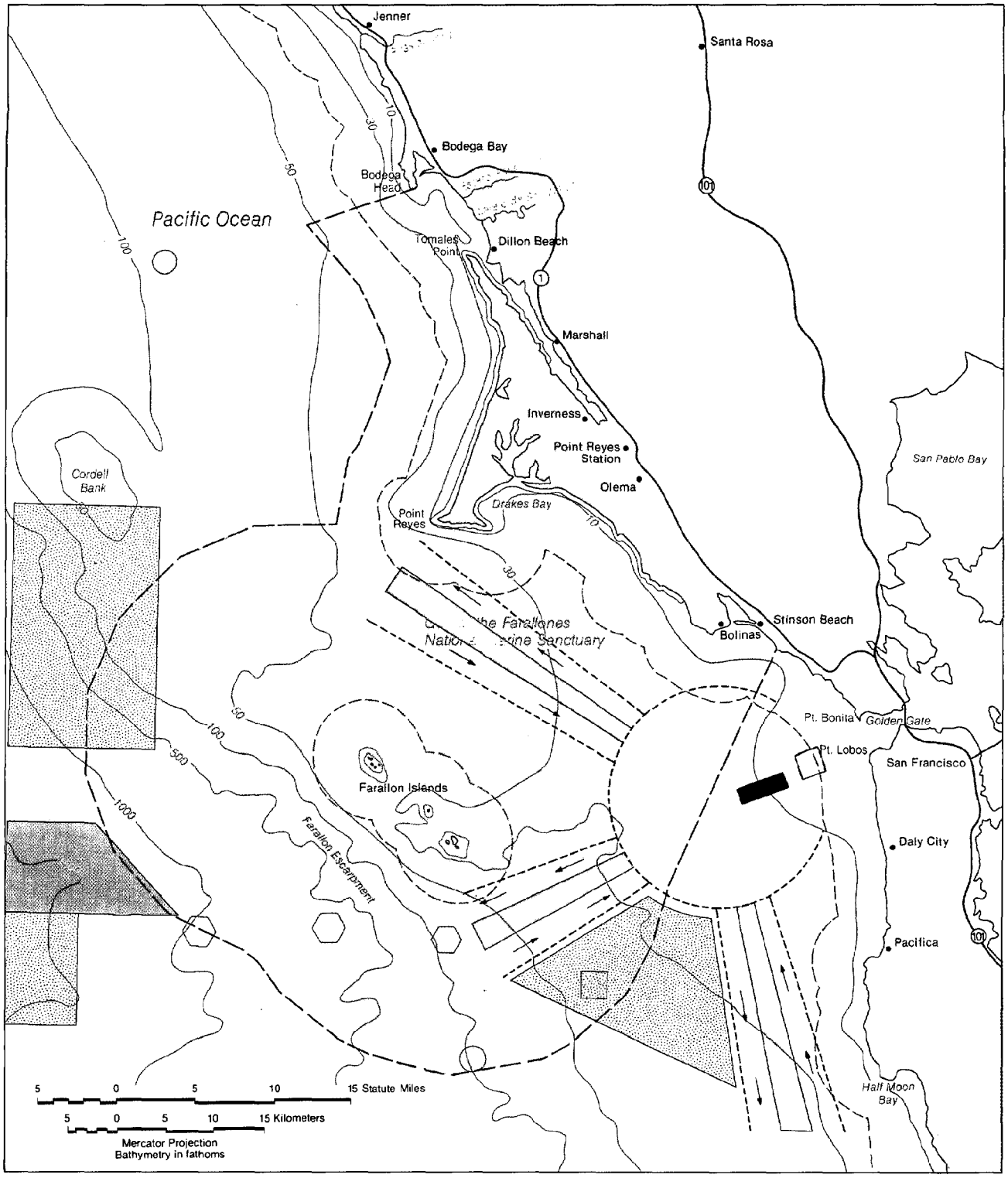
(D) Education and Interpretation

Agencies managing public lands adjacent to the sanctuary have been responsive to visitor needs and have provided a broad range of interpretive and educational services. Many existing programs emphasize the interpretation of coastal resources dependent on sanctuary waters (e.g., waterfowl, marine mammals, lighthouses, and other maritime and coastal defense structures). NOAA (1984c) provides a complete review of the San Francisco Bay organizations that offer educational programs in the sanctuary. The following is a brief summary.

The sites which to date have been the stage for many interpretive programs are the Point Reyes National Seashore and Bolinas Bay and Lagoon. The marine-related resources receiving the most attention at the Seashore are gray whales, marine birds and waterfowl, sea lions and seals, the Lighthouse, and the story of Sir Francis Drake. A variety of media and outdoor facilities are used to convey these themes, including wayside exhibits, brochures, shelters, information kiosks, and a new visitor center at Bear Valley.

The main areas within the Golden Gate National Recreation Area with a coastal orientation are Baker Beach, Ocean Beach, Fort Funston, the Cliff House, Marin Headlands, Tennessee Beach, Muir Beach, and Stinson Beach. Facilities such as trails and overlooks are used to interpret coastal resources. The Marin county naturalist conducts guided tours for schools and groups at Bolinas Lagoon, Duxbury Reef, and other areas in West Marin County. The themes emphasized at Bolinas Lagoon (i.e., at the lagoon proper, and the Audubon Canyon Ranch interpretive center) are the heronry, other waterfowl, harbor seals, and Bolinas history. The reef walks at Duxbury Reef initiate visitors to the intertidal life and processes. The area is also used for frequent school excursions. Facilities at Duxbury Reef and Agate Beach are limited despite fairly heavy use and good access (Chan 1984).

Marine-related interpretation appears to be currently limited in Tomales Bay. Tomales Bay State Park is used regularly for clamming and there are wayside exhibits interpreting estuarine resources. The coast at Marshall and Millerton is presently undeveloped, but there are plans for developing a coastal interpretive program (California Coastal Commission 1981). Interpretation (guided tours, wayside exhibits) of saltmarsh resources also take place at the lands held by the Audubon Canyon Ranch (i.e., Walker Creek, Cypress Grove, Livermore Marsh, Shields Marsh). Some marine-related interpretive programs exist at Doran County Park and Bodega Head State Park, and both sites represent excellent vantage points to view the sanctuary.



Source: Joseph, et al., 1971. Minerals Management Service, 1987. NOAA, 1984d.

- Gulf of the Farallones National Marine Sanctuary Boundary
- Existing Shipping Lanes
- Submerged Submarine Operating Areas
- Active Dump Sites
- Historic or Inactive Dump Sites
- Inactive Military Dump Site

Figure 11

Shipping and Other Marine Activities

Interpretive and education programs focusing on the Farallon National Wildlife Refuge (administered by the U.S. Fish and Wildlife Service) take place at the San Francisco Bay National Wildlife Refuge Interpretive Center, located in Fremont (Bitsko, pers. comm.). Because of the extremely dense population of ground-nesting birds and the hazards involved in landing and walking on the site, the Farallon Islands are closed to the public and there is no on-site interpretation. The Point Reyes Bird Observatory, an independent organization conducting research on the islands, provides information concerning the Farallon Islands through its newsletter, a nature seminar program, and exhibits at a small information center located at the Palomarin trailhead in the Point Reyes National Seashore.

Offshore educational and interpretive services offered during cruises in the Gulf of the Farallones are primarily undertaken by private environmental education groups such as the Oceanic Society, the Point Reyes Bird Observatory, the College of Marin, Golden Gate Audubon Society, other Audubon Societies, the Bodega Marine Laboratory, the Point Reyes Field Seminars, and Whale Center. There are usually naturalists on board the boats to identify and interpret the seabirds, cetaceans, and pinnipeds sighted during the excursion. Most of these organizations have periodic newsletters announcing excursions, and discussing issues relating to sanctuary resources. Many also have a well-developed educational program aimed at informing San Francisco Bay area residents through workshops and seminars of the need for national marine sanctuaries and other types of marine protected areas.

There are clearly many existing marine educational programs already underway in the Bay area that relate to the Gulf of the Farallones. There is a need to design education programs for the sanctuary that do not unnecessarily duplicate existing services and which collaborate with related groups with established audiences. There is also an opportunity for the Marine and Estuarine Management Division to offer programs with a new focus on marine protection and management.

(E) Scientific Research

Several government and non-government organizations have ongoing marine research programs in the sanctuary. Two areas within the Point Reyes National Seashore — the Point Reyes headlands and the Estero de Limantour — are designated as "research natural areas" by the National Park Service and "reserves" by the California Department of Fish and Game. There is also an extensive marine research program based at the Farallon Islands and carried out by research institutions such as the Point Reyes Bird Observatory and the University of California in collaboration with the U.S. Fish and Wildlife Service and other Federal agencies such as the Minerals Management Service and the National Marine Fisheries Service. Several other organizations including the Bodega Marine Laboratory of the University of California, the College of Marin, and the California Academy of Sciences conduct marine research in the sanctuary.

(F) Military Operations

The U.S. Navy and the U.S. Coast Guard use the Gulf of the Farallones region for their operations. The U.S. Navy's third fleet regularly occupies the area for surface, air, and submarine maneuvers.

Submarine activities occur just beyond the sanctuary area to the north, where there is a special submarine transit lane used for approaching and departing San Francisco Bay. The two submarine operation areas are located 8 nautical miles southeast and 9 nautical miles northwest of the Farallon Islands. The U.S. Navy also conducts aircraft and surface vessel exercises within the sanctuary area approximately 10 nautical miles southwest of the Point Reyes Headlands.

The U.S. Coast Guard flies maintenance personnel by helicopter to the lighthouse on Southeast Farallon Island for periodic servicing. The U.S. Coast Guard also conducts regular helicopter flights within the sanctuary for aerial offshore enforcement around the Farallon Islands. They also conduct search and rescue missions to a number of destinations along the coast, passing over Bolinas Lagoon and Tomales Bay en route to marine areas northwest at the Point Reyes Peninsula.

EXISTING JURISDICTIONS AND MANAGEMENT

The sanctuary overlaps several existing jurisdictions. Coordination and cooperation among the responsible agencies have been important aspects of sanctuary management since its designation. The agencies may have focused on different resources or have designated different parts of the sanctuary for special management, but generally goals are consistent with protection and sustainable development of the area. These agencies and their involvement in managing the sanctuary to date are described below. A more detailed description of roles and responsibilities is provided under "Administration" and in Appendix 5.

(A) Sanctuary Management

The National Marine Sanctuary Program is administered by the Marine and Estuarine Management Division, National Oceanic and Atmospheric Administration in the Department of Commerce. The Division staff based in Washington, D.C. make overall policy decisions and coordinate with on-site staff. In the early years since designation, on-site staff has consisted of a Sanctuary Manager, Deputy Sanctuary Manager, a Research

Coordinator, and a California Department of Fish and Game Sanctuary Warden. The program is implemented through cooperative agreements with the National Park Service Western Region and the California Department of Fish and Game.

Since designation, management of the sanctuary has been aimed at the protection of significant marine resources. The resource protection program has focused on monitoring critical resources through sanctuary-funded programs and augmenting and improving the coordination of surveillance and enforcement activities, in collaboration with the California Department of Fish and Game. The accidental oil spill caused by the T/V *Puerto Rican* in 1984, and incidents in other sanctuaries, have also made emergency response and contingency planning measures a high priority for the resource protection program of all sanctuaries.

Past and ongoing research, undertaken with the National Park Service and the National Marine Fisheries Service, has included studies of pinnipeds, seabirds, shorebirds, and intertidal invertebrates. The interpretive program, undertaken in cooperation with the National Park Service, has led to the design and distribution of a sanctuary brochure, the design and installation of wayside signs, a lecture series, and the provision of interpretive services at selected Point Reyes National Seashore and Golden Gate National Recreation Area locations.

(B) Federal Activities

The National Park Service is involved in the management of the sanctuary through an interagency agreement with the Marine and Estuarine Management Division. The National Park Service manages the Golden Gate National Recreation Area (GGNRA), the most visited national park in the country. The park includes a network of recreational and historic sites along the Pacific Ocean shoreline and in the San Francisco Bay area that are marine-related and therefore can provide orientation to the sanctuary. Areas for coordination with GGNRA include interpretation, and administrative support. The association with the park also offers access to several coastal facilities and the park's cooperating association, the Golden Gate National Park Association.

The National Park Service also administers the Point Reyes National Seashore (PRNS). The Seashore represents the largest stretch of shoreline adjacent to the sanctuary. It also includes certain state tide and submerged lands that have been conveyed to the PRNS for all purposes except exploration and development of minerals. The state, however, has reserved the right to manage the tide and submerged lands conveyed to the National Seashore and therefore controls activities such as oyster culture in Drake's Estero.

National Park Service management policies for the PRNS are designed to protect natural and cultural resources while providing appropriate opportunities for public enjoyment. The NPS Management Plan establishes Natural Zones which are to remain unaltered by human activity. This management scheme complements California Marine Life Reserves designated at Point Reyes Headlands, and Estero de Limantour. Since the PRNS and sanctuary share many living resources, efforts have been made to coordinate activities.

The U.S. Fish and Wildlife Service (FWS) manages the Farallon National Wildlife Refuge. The Refuge is comprised of five islands (North, Middle, and Southeast Farallon Islands, Maintop Island, and Noonday Rock). The Refuge is operated primarily as a migratory bird refuge to protect, among others, murres, auklets, guillemots, and puffins. The Refuge also protects seals, sea lions, and other marine mammals. Technically, only those portions of the islands which are above the mean high water mark are included in the Refuge; areas which are inundated by the average high tide are not part of the Refuge (Bitsko, pers. comm.).

Southeast Farallon Island is the largest of the islands with an area of 109 acres. The remaining islands in the Farallon chain stretch northwesterly for 4 miles, with some being completely awash on stormy days. The six northerly islands cover less than two acres.

Because of the extremely dense population of ground-nesting birds and the hazards involved in landing, the Farallon Islands are closed to the public and special permits are required for landing. Unauthorized landings on any of the islands are strictly prohibited. Low-flying aircraft, which would disturb the island's wildlife, are also prohibited over the Farallon Islands.

The other Federal agencies with management responsibility in the sanctuary are:

- National Marine Fisheries Service (research)
- U.S. Coast Guard (marine safety, oil spill response, search and rescue)
- Environmental Protection Agency (ocean dumping)

(C) State and Local Activities

The California Department of Fish and Game is responsible for the management of living marine resources in California, including the three-mile state waters' portion of the sanctuary (Fish and Game Code, Title 14 of the California Administrative Code). State management is aimed at the conservation, maintenance, and utilization of living marine resources. The primary management vehicle is the dissemination and enforcement of California commercial and sport fishing regulations which are updated periodically by the Fish and

Game Commission. The California Department of Fish and Game has established ecological reserves, marine reserves, game refuges, and marine life refuges in the ocean waters and submerged lands surrounding the Farallon Islands and the Point Reyes Peninsula (see figure 12). Within these areas, the California Department of Fish and Game has the authority to prohibit or restrict activity (to varying degrees depending on the designation) which may harm the resources, including fishing, collecting, swimming, boating, and public entry. Regulations specific to the ecological and marine reserves within the sanctuary include, for example, prohibitions on the taking of invertebrates, boating closure areas, and restrictions on the use of nets within specified depths (California Department of Fish and Game 1982a). Since designation, the California Department of Fish and Game has augmented surveillance and enforcement in the sanctuary through cooperative agreements with the Marine and Estuarine Management Division.

The California State Water Resources Control Board has designated six Areas of Special Biological Significance (ASBS) in the waters of the sanctuary (see figure 12). ASBS sites are designated to preserve and maintain high water quality in special biological communities by prohibiting discharges of elevated temperature wastes and point source sewage of industrial wastes.

The other state and local agencies with management responsibility in the sanctuary or in coastal areas adjacent to the sanctuary include:

- California Coastal Commission
- California State Lands Commission
- California Department of Parks and Recreation
- Counties of Marin and Sonoma

The counties of Marin and Sonoma both have Local Coastal Plans (LCP) that have been certified by the California Coastal Commission (Marin County Planning Department 1983; Sonoma County Department of Planning 1982). These plans contain policies for coastal development and the protection of coastal habitats. In several instances, these policies relate to and reinforce the objectives of the sanctuary (see Appendix 7). For example, the Marin County LCP (Unit 1) provides policies for the protection of Bolinas Lagoon and Duxbury Reef which are both within the sanctuary. The northern component of the LCP (Unit 11) includes resource protection policies for Tomales Bay, and adjacent wetlands.

The Sonoma County LCP includes policies for the protection of rocky intertidal habitats, the offshore areas at the mouth of Estero Americano, limitations to access to offshore rocks, and protection of marine mammal haul-out areas. Clearly, these policies complement sanctuary objectives. These coastal plans are used by the counties to decide upon and issue coastal permits for a wide variety of land uses including waste treatment facilities, shoreline structures, and boating facilities. The Coastal Commission retains coastal permit jurisdiction over certain aspects of submerged lands and tidelands within state waters.

There are many local public and private non-profit organizations that have been actively involved with the establishment of the sanctuary. These include research organizations such as the Bodega Marine Laboratory (University of California at Davis), the Point Reyes Bird Observatory, and the California Academy of Sciences. Local environmental education groups such as the Oceanic Society, the Whale Center, and many others (NOAA 1984c) have provided assistance to the Marine and Estuarine Management Division in carrying out educational programs.

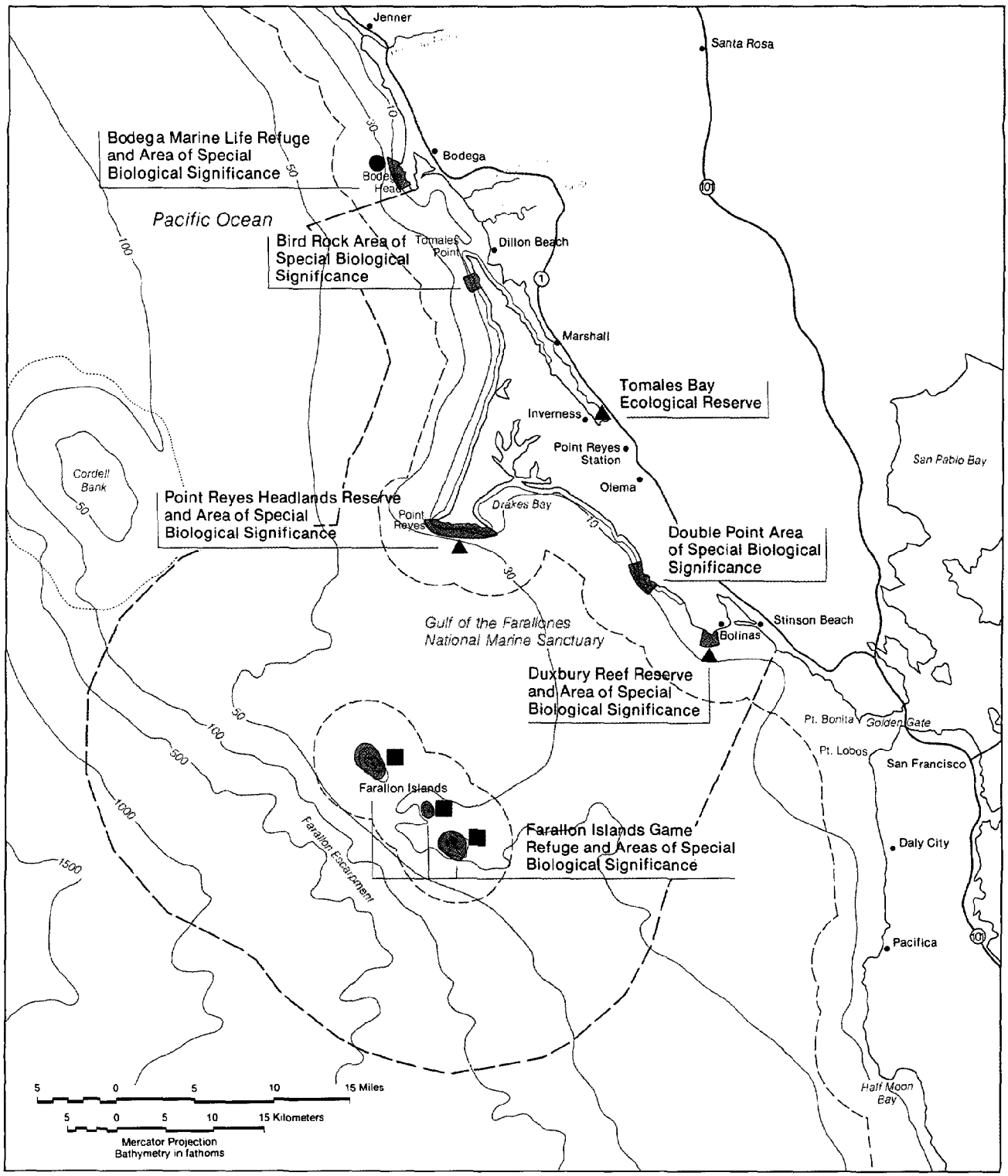


Figure 12

Marine Protected Areas

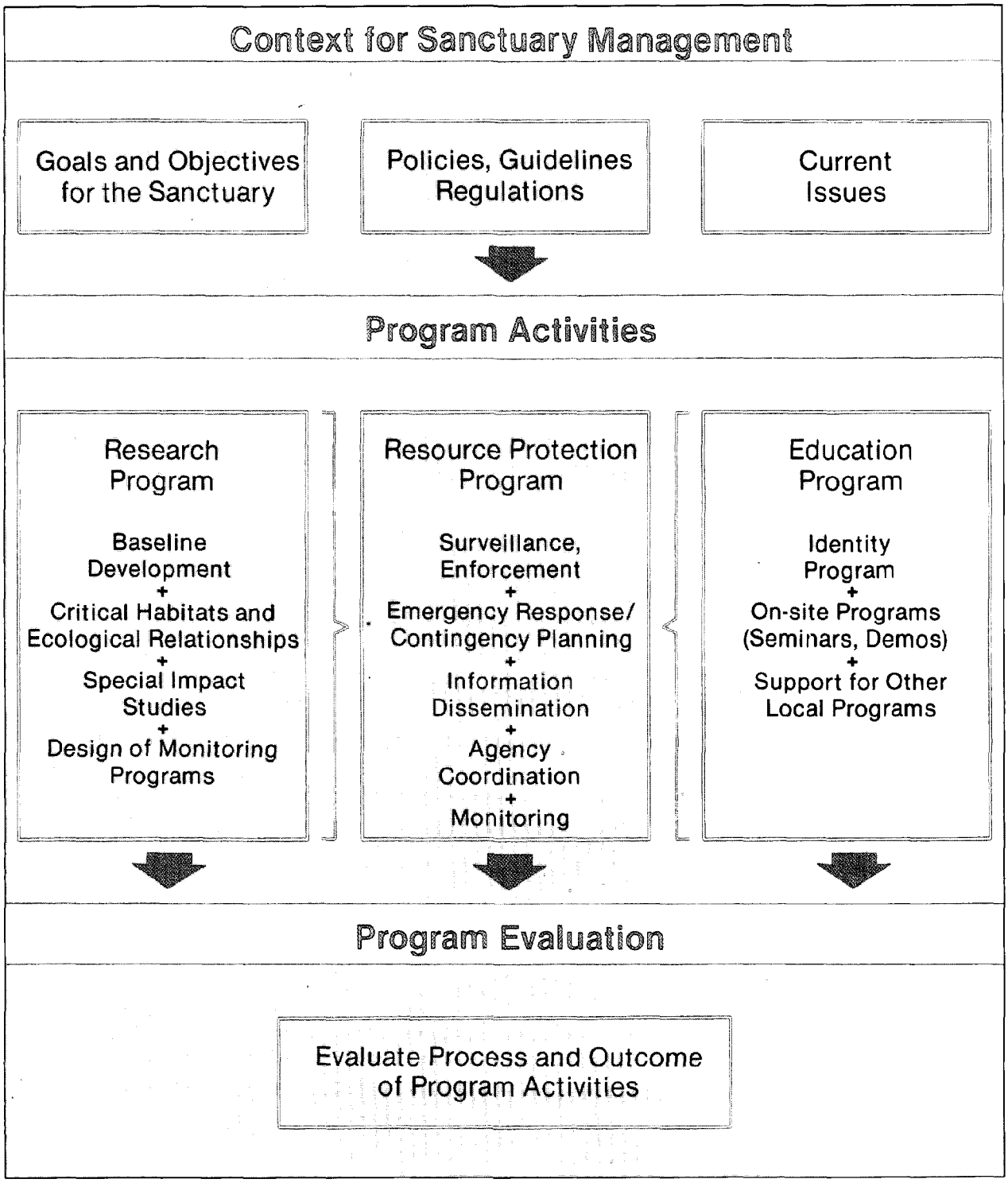
Three

Gulf of the Farallones
National Marine Sanctuary

ACTION PLAN

ACTION PLAN

Since designation of the site in 1981, the Marine and Estuarine Management Division has initiated programs for marine education and interpretation, selected scientific research relevant to sanctuary management, and coordinated surveillance and enforcement. The Division has also resolved through the management planning process numerous issues, including the best location for the headquarters. The action plan included here uses this experience as a starting point for sanctuary management to develop new directions and expand existing programs. It is a blueprint for what will be accomplished by the Marine and Estuarine Management Division and other collaborating agencies over the next five to ten years.


Context for Sanctuary Management
Goals and Objectives for the Sanctuary
Policies, Guidelines Regulations
Current Issues
Program Activities
Research Program
Baseline Development
+
Critical Habitats and Ecological Relationships
+
Special Impact Studies
+
Design of Monitoring Programs
Resource Protection Program
Surveillance, Enforcement
+
Emergency Response/ Contingency Planning
+
Information Dissemination
+
Agency Coordination
+
Monitoring
Education Program
Identity Program
+
On-site Programs (Seminars, Demos)
+
Support for Other Local Programs
Program Evaluation
Evaluate Process and Outcome of Program Activities

OVERALL MANAGEMENT FRAMEWORK

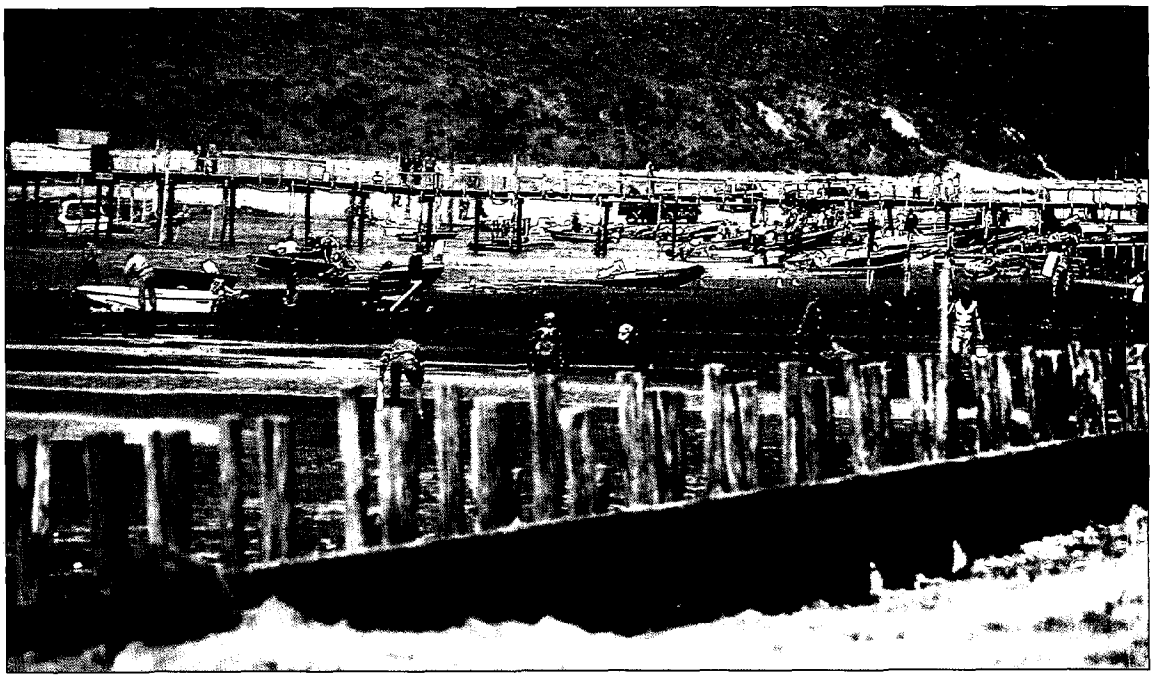
As detailed in the last section, long-term protection of significant marine resources in the Gulf of the Farallones is the highest priority for the sanctuary's management. In many ways, the current capability for managing and protecting marine resources is limited compared to the capability for managing terrestrial or estuarine parks. However, improved approaches and techniques are being developed (Salm and Clark 1984; Dobbin and Lemay 1985). The objective is to apply these to the sanctuary and gradually build a capability for improved management of the marine environment.

The two additional components of the action plan — "Research" and "Education" — are designed to support the resource protection program for the sanctuary. The broad management framework where resource protection represents the core responsibility of the program and education and research are designed to support the marine resource protection focus is illustrated in figure 13.

In this sanctuary, perhaps more than in others, marine resource protection will encompass an unusually wide variety of living resources and habitats. The latter include coastal wetlands, shallow bays, the Gulf of the Farallones, and the edge of the continental shelf. The plan therefore prescribes actions tailored to the specific parts of the sanctuary. The focus is on practical measures for protection, rather than rigorous zoning schemes or large-scale facility development which would be clearly inappropriate in this setting.

Assigning priorities according to critical issues in different areas will be mandatory for cost-effective use of limited funds and staff. In all such tasks, the need for coordination among Federal and state agencies which share responsibilities plays an important role. Coordination will avoid costly duplication of effort, develop increased cooperation with other key agencies, and move toward the management of the Gulf as an integrated marine unit.

Following approval of this plan, activities can be phased over the years ahead. The focus in the early years will be to continue to establish the sanctuary's identity, formalize collaborative arrangements with other agencies, and build a resource management capability. In subsequent years, as funding becomes available, the program could be expanded to include more staff, a stronger on-site presence, and possibly long-term research and monitoring programs. Some adjustments to the program will be required to accommodate the potential designation of the Cordell Bank site immediately north of the Gulf of the Farallones National Marine Sanctuary.



GUIDELINES FOR DETERMINING MANAGEMENT ACTIONS

There are several ways of analyzing the existing status of the sanctuary to determine management actions that are required now and over the next few years. An effective approach, and the one used here, is the issue analysis process (Dobbin and Lemay 1985; NOAA 1983a, 1983b). This process identifies potential issues, defines why these represent a problem or concern for sanctuary management, provides evidence that the issues are in fact ones that should be resolved, and develops a series of actions that accomplish this. The resulting actions, when taken together, form the overall program (for a prescribed period of time) for improved management and protection of sanctuary resources. Such management is the main objective of the Marine and Estuarine Management Division. The following summarizes the basic steps of the issue analysis process:

Step 1: Identify and describe each issue.

Step 2: Develop evidence or facts that verify that each issue is real and relevant to sanctuary management.

Step 3: Relate each issue to the National Marine Sanctuary Program; if it is not relevant to the Program, it is not an issue to be addressed within the management plan.

Step 4: Define action(s) that resolve each issue.

Step 5: Combine the various actions and develop an overall program of activities over a specific period of time.

This analysis produced a broad array of issues for this management plan. These were evaluated during a research workshop for the sanctuary, ongoing discussions with sanctuary staff and other agencies such as the California Department of Fish and Game, the California Coastal Commission, the National Park Service, and the U.S. Coast Guard. The complete analysis is presented in Table 1. Issues that were generally agreed upon have been organized as follows:

- Issues that relate directly to marine resource protection or management (resources at risk)
- Issues that relate to scientific research and the information needed to effectively manage marine resources (inability to do anything until more is known)
- Issues that relate to public awareness and understanding of sanctuary resources and management
- Issues that relate to the administration of the sanctuary and implementation of its management program

By means of a comparison with program objectives and a screening process, the individual actions aimed at single issues were consolidated into program areas (see Table 2 under the topics of Resource Protection, Research, Education and Interpretation).

The remainder of the action plan provides additional information for each of the following program areas.

TABLE 1

MANAGEMENT ISSUE/ACTION ANALYSIS

Issues Relating Directly to Resource Protection and Management

MANAGEMENT ISSUE	EVIDENCE	RELATION TO THE NATIONAL MARINE SANCTUARY	ACTIONS
1. *Potential Accidental Spills and their Effects on Sanctuary Resources* There is a probability of an accidental spill occurring in the area over the next decade given the amount of tanker and other merchant vessel traffic passing through the sanctuary and immediately south. Traffic is also likely to increase over the next decade. Depending on the volumes and products discharged, currents and other weather conditions, an accidental spill could affect sanctuary resources. The immediate and long-term effects of spills of various types of products are not well understood and the capability for effectively controlling the effects of a major spill is limited.	1971 Collision of two tankers (840,000 gallons). 1984 T/V *Puerto Rican* spill (1.7 million gallons) 1973-84 numerous small vessel spills in SFB and north of the sanctuary. In calendar year 1981, an average of 3 tankers plus 7 other types of vessels per day entered the Bay [compared to an average of about 8 tankers and 16 other merchant vessels passing through the Santa Barbara Channel each day] (NOAA 1980).	Relates to the sanctuary discharge regulation. Relates to sanctuary objective of reducing threats to and protection of sanctuary resources.	Compile information on resources at risk from accidental discharges. Evaluate current response capability within the sanctuary and investigate alternatives for increasing capability. Prepare and implement an emergency response and contingency plan.
2. *Chronic Pollution of Sanctuary Waters* There are offshore and land-based sources of pollution that could be affecting sanctuary waters. The location and volumes of chronic discharges have not been well documented. The long-term effects of these discharges on sanctuary resources are not known.	Chronic releases from the T/V *Puerto Rican*. CF&G violation reports of vessels illegally discharging pollutants in the sanctuary. PRBO Farallon logs reporting incidents of oiled birds and small diesel fuel spills from unknown sources on Southeast Farallon Island since 1970. Historic radioactive waste disposal sites 4-14 mi (6-23 km) from Southeast Farallon Island.	Relates to the sanctuary discharge regulation. Relates to the sanctuary objective of reducing threats to resources.	Access historical patterns in oiled birds at the Farallons. Continue to monitor chronic incidence of oiled birds within the sanctuary. Review and if needed revise discharge regulations to facilitate enforcement. Assess trends in discharge violations to determine the need for increased patroling on the water. Develop agreements to provide for increased enforcement of regulations.

Issues Relating Directly to Resource Protection and Management, Cont.

MANAGEMENT ISSUE	EVIDENCE	RELATION TO THE NATIONAL MARINE SANCTUARY	ACTIONS
3. *Marine Mammal and Seabird/Fishery Interactions* Efforts to determine the nature and extent of marine mammal and seabird/fishery interactions have been underway since 1979. From 1979-1982, the amount of gill and trammel net fishing and the number of fishermen using entangling type nets increased dramatically in central and northern California; and incidental take increased accordingly (NOAA 1980; Marine Mammal Commission 1984). Gill netting was prohibited in Monterey Bay for a limited period in 1982. This caused gill net boats to shift north and incidental take of harbor porpoise and seabirds increased substantially in Marin County. In July 1984, the State of California enacted legislation restricting the use of gill nets in a number of areas from Point Reyes to Monterey Bay. Fishery observations and marine mammal stranding data indicate that the restrictions did not eliminate, and may not have reduced the incidental take of harbor porpoise, harbor seals, and other marine mammals in these areas (Marine Mammal Commission 1984; Allen 1984). In September 1987, state legislation further restricted the use of gill nets south of Point Reyes and prohibited gill and trammel net use north of Point Reyes. The legislations also provided assistance to fishermen in converting to other fishing gear. A related issue seems to be the entanglement of marine mammals and other organisms in lost or discarded fishing gear and other marine debris (Marine Mammal Commission 1984).	Commercial gill net fisheries in the sanctuary incidentally killed many small marine mammals in 1982, 1983, and 1984 (Allen and Huber 1984). Entanglement in gill nets was determined to be the cause of death in 50% of necropsies performed on marine mammals collected in the sanctuary between 1982-1984 (mainly harbor porpoise, harbor seal, C. seal lion) (Dieter 1984).	Relates to the sanctuary objective of reducing threats to resources. Relates to the MMPA-a federal act considered part of the resource protection program. Discarded fishing gear may relate to the sanctuary discharge regulation.	Continue to monitor the incidence of marine mammal mortalities caused by gill-netting. Provide regulatory agencies scientific information for the development of improved regulations and possible mitigating actions. Collaborate with NMFS, CF&G and other agencies to prepare and disseminate information to the fishing industry on the extent of the gill-netting problem and entanglement in lost gear, including effects on marine species and threat to human safety. Coordinate with state and Federal agencies in monitoring effects of new closures. Support recommendations made at the 1984 Workshop on the Fate and Impact of Marine Debris.

Issues Relating Directly to Resource Protection and Management, Cont.

MANAGEMENT ISSUE	EVIDENCE	RELATION TO THE NATIONAL MARINE SANCTUARY	ACTIONS
4. ***Visitor Use Impacts on Marine Mammals, Intertidal Invertebrates, and Other Sensitive Resources***			
In areas where there is good coastal access, current levels of visitor use have caused disturbances to sanctuary resources. Harbor seals that haul-out on mainland beaches and intertidal species such as abalone, limpets, and mussels have been particularly affected. There is evidence that human-related disturbances of harbor seals may be affecting pup production and that some invertebrate populations are heavily depleted in the sanctuary. Future increases in visitor use could lead to even more pronounced impacts on sanctuary resources.	Chan (1984) reports that populations of some species of intertidal and subtidal organisms in areas of the sanctuary are depleted due to collecting. CF&G violation reports of undersize abalones or exceeded limits. Allen and Huber (1984) report a variety of human-related disturbances to harbor seals.	Relates to the sanctuary objectives of reducing threats to resources and sensitizing visitors to the vulnerability of specific resources. Relates to MMPA and State of California living marine resources regulations that are considerd part of the sanctuary resource protection program.	Continue monitoring and/or encourage other agencies to monitor intertidal and subtidal sites within the sanctuary that are heavily harvested. Continue to monitor periodically (1-2 year intervals) human-related levels of disturbance on harbor seals and support research to assess potential effects on population. Assess trends in illegal take violations to determine the need for increased patrolling on the water. Provide to regulatory agencies scientific information for the development of improved regulations including the designation of additional special protected areas within the sanctuary if warranted. Develop and disseminate public information on the vulnerability of affected resources (invertebrates, seabirds, and marine mammals). Enforce existing regulations prohibiting collection.

Issues Relating Directly to Resource Protection and Management, Cont.

MANAGEMENT ISSUE	EVIDENCE	RELATION TO THE NATIONAL MARINE SANCTUARY	ACTIONS
5. *Maintaining the Quality of Sensitive and/or Critical Habitats within the Sanctuary*			
The sanctuary contains some of California's most pristine estuaries and saltmarshes, unique intertidal pools, subtidal reefs, and eel grass beds. The roles of these areas as critical spawning or nursery habitats for sanctuary resources such as the Pacific herring, salmon, rockfish, and Dungeness crab need to be confirmed. These habitats are exposed to a variety of on-shore land-use related impacts including agricultural run-off (fertilizers, sediments), municipal wastes discharges (nutrients, public health hazard, contamination of organisms), coastal construction activities (sediments), water diversion (increased salinity in estuaries), and physical trampling.	CF&G Mussel Watch program. Comments received at the sanctuary research workshop on Tomales Bay, and Bolinas Lagoon. California Regional Water Quality Control Board Reconnaissance reports on ASBS within or adjacent to the sanctuary. USGS Port Access Route Study and consideration of a revised TSS for SFB entrance. Proposal for exploratory drilling (Minerals Management Service 1983).	Relates to the sanctuary objective of implementing an ecosystem approach to marine resource protection and encouraging other agencies to consider the relationships between sensitive marine resources and coastal land use in the review and approval of development proposals.	Participate in the review of major coastal (and offshore) development proposals or new activity proposals that could affect sanctuary resources. Provide scientific information on the sensitivity of sanctuary resources for potential developments to land use regulatory agencies.

Issues Relating to Scientific Research and the Information Needed To Effectively Manage Marine Resources in the Sanctuary

MANAGEMENT ISSUE	EVIDENCE	RELATION TO THE NATIONAL MARINE SANCTUARY	ACTIONS
1. *Incomplete Baseline Information about the (Seasonal) Distribution, Abundance, and Status of Marine Resources Particularly within the Gulf of the Farallones*			
Data are available on the Gulf's distribution of seabirds and the coastal distribution of aquatic birds for example, but there are still significant gaps about the distribution and abundance of cetaceans, some of the pinnipeds and the lower parts of the food chain. In some cases, baseline data may be available, but a sanctuary-wide assessment has not been carried out to determine whether they are adequate.	Recognition of data gaps in Ainley et al., 1981, in information about seabirds and marine mammals in the sanctuary. Conclusions reached by regional scientific experts at the sanctuary research workshop, 1983, pointed out the need for more complete information on a variety of species, habitats, and processes in the santuary. White shark and humpback whale research has been undertaken to investigate these important animals and their use of the sanctuary, about which very little is known.	Relates directly to the effective implementation of a resource protection program. Relates to sanctuary objective of moving towards a comprehensive assessment of the sanctuary's marine resource information base to identify gaps in our ability to manage the site.	Assess adequacy of baseline information for fish and invertebrates, cetaceans and possibly seabirds and pinnipeds in the Gulf (i.e., summary of knowledge). Support research projects that address confirmed baseline data gaps affecting marine resource management within the sanctuary. Prepare a data atlas of resources and uses in the sanctuary.
2. *Incomplete Information On the Dependence of the Population of the Gulf of the Farallones on Food Resources and Critical Habitats*			
Information is available on some critical ecological relationships within the Gulf of the Farallones (Page et al. 1984). The evidence now available suggests that there is a variety of habitats within the Gulf of the Farallones and some of the bays which are playing a critical role in the life history of some species. There is very little information available on the dependence of cetaceans and pinnipeds on these habitats.	PRBO, 1985 Current questions about humpback whale ecology which have led to the development of a research project. Conclusions reached at the sanctuary research workshop, 1983. Report on sanctuary research priorities and needs.	Relates directly to the effective implementation of a resource protection program. Relates to sanctuary objective of identifying those resources most in need of management attention.	Continue to support and implement selected investigations that clarify key ecological relationships within the Gulf of the Farallones. Feeding and movement studies.

Issues Relating to Scientific Research and the Information Needed To Effectively Manage Marine Resources in the Sanctuary, Cont.

MANAGEMENT ISSUE	EVIDENCE	RELATION TO THE NATIONAL MARINE SANCTUARY	ACTIONS
3. ***Information on the Effects of Natural Events and Human-Related Activities on Populations Within the Sanctuary***			
There is evidence that oceanographic events and human-related activities are having an effect on populations of marine mammals and seabirds. Some of these effects could cause a long-term change in the status of some populations but that is not known. It also has been difficult to isolate changes due to natural population fluctuations, natural events, and human activity.	Observations on the El Nino effect on seabird populations and fish and invertebrates within the Gulf of the Farallones. Observations on the effects of gillnetting on seabird and marine mammals within the Gulf. Questions about the effects of chronic discharges from the sunken stern of the T/V *Puerto Rican*.	Relates directly to the effective implementation of the resource protection program. Relates to sanctuary objective of encouraging management-oriented research.	Continue to support and implement investigations on the effects of human-related disturbances on populations. Selected population monitoring to detect sudden or gradual changes.

Issues That Relate to Public Awareness And Understanding of Sanctuary Resources and Management

MANAGEMENT ISSUE	EVIDENCE	RELATION TO THE NATIONAL MARINE SANCTUARY	ACTIONS
1. ***Basic Public Awareness of the Gulf of the Farallones National Marine Sanctuary as a Distinct Marine Protected Area***			
Although several programs have been initiated to address this concern, the sanctuary still lacks identity as a *marine* protected area in many ways distinct and complementary to existing coastal protected areas such as the Point Reyes National Seashore. Many visitors and the San Francisco Bay public need to be made aware of the sanctuary, its location, what it stands for, and the mission of the program.	Results of the surveys conducted for the Education Plan (NOAA 1984). Public and agency response during the T/V *Puerto Rican* incident, indicating ignorance of the sanctuary's existence. Response from the general public at special events continues to be confused and misinformed.	Relates directly to the effective implementation of the resource protection program. Relates to sanctuary objective of providing information and increasing awareness.	Implement a well-planned identity program (brochures, posters, etc. - see text for description) that stresses the sanctuary as the Gulf of the Farallones and the program playing an active role in marine resource management. Maintain the sanctuary as a priority on the public agenda.
2. ***Obtaining Public and Agency Support for and Commitment to the Sanctuary, and its Management Program***			
Getting people more informed may not be enough to have an affect on resource protection. Getting the public and other agencies involved (including having them provide input into decisions) can make a more substantial difference. The fact that there are so many other related programs and agencies in the SFB area also means that there's a need to define the kind of impact the sanctuary wants to have on its public.	Related experience in other agencies moving away from interpretation as entertainment towards education aimed at specific resource protection objectives. Results of the survey conducted for the *Education Plan* (NOAA 1984c).	Relates directly to the effective implementation of the resource protection program. Relates to the mission of the national program.	Workshops reporting research results or discussing resource protection issues. Workshops, seminars, field volunteer programs.

Issues that Relate to the Administration of the Sanctuary And Implementation of its Management Program

MANAGEMENT ISSUE	EVIDENCE	RELATION TO THE NATIONAL MARINE SANCTUARY	ACTIONS
1. *Establishment of Priorities and Balance among Priorities for Sanctuary Management over the Next 5-10 Years* The administration of the site and coordination of a marine resource protection program with other federal and state agencies is a relatively complex task. The exact nature of the NMS program's involvement in day-to-day marine resource protection issues and decisions is developing gradually and this needs to be the focus for the next few years. There is a need during this "start-up" phase not to overextend limited operational resources (both staff and funds). This dictates a careful selection of priorities for implementation on an annual or bi-annual basis (particularly among Resource Protection/Education/Research activities).	Key operational decisions made since designation have significantly effected improved conditions for implementation. Comments received from other federal agencies on the need to define the focus of the sanctuary's resource protection program.	Relates directly to the effective implementation of the program.	Develop clear short-term objectives for the overall sanctuary management program that reflect priorities assigned to Resource Protection, Research, Education. Establish priorities both functionally and geographically. Undertake an "outcome" evaluation of the program. Make day-to-day work with other marine resource management agencies among the highest priorities. Work toward the development of clear marine resource protection policies (for internal use) for sanctuary management.

Issues that Relate to the Administration of the Sanctuary And Implementation of its Management Program, Cont.

MANAGEMENT ISSUE	EVIDENCE	RELATION TO THE NATIONAL MARINE SANCTUARY	ACTIONS
2. ***Developing Alternative Mechanisms for Implementation of Research, Education, and Resource Management Projects***			
In addition to dictating clear priorities, limited operational funds call for the development of new mechanisms for a wide variety of projects. These include, for example, the production of documents, promotional materials, educational services, maintaining a reference library and possibly a Gulf of the Farallones resource information system. Several ongoing projects are helping to define these varied requirements.	Comments received during the plan preparations process.	Relates directly to the effective implementation of the program.	Investigate the need for additional cooperative agreements. Investigate alternative arrangements for the creation of a sanctuary cooperative association.

TABLE 2
SUMMARY OF ACTIONS

The following table lists the major actions derived from the issue analysis as presented on Table 1, but reorganized according to the three main program areas: resource protection, research, and education and interpretation.

RESOURCE PROTECTION	RESEARCH	EDUCATION AND INTERPRETATION
Identify resources at risk	Assess adequacy of baseline for management	Implement identity program
Emergency response and contingency planning	Fund scientific investigations that address baseline gaps for cetaceans, fish, intertidal invertebrates, seabirds, marine mammals	Develop publications
Initiate assessment of capability	Investigate ecological relationships such as feeding and movement patterns	Develop media program
Monitor oiling incidence	Undertake impact studies	Implement educational activities (lecture series)
Assess regulations and discharge violation patterns	Establish procedures for emergency research	Establish a cooperating association
Provide technical advice on gill-netting impacts		
Monitor use impact on invertebrates and harbor seals		
Disseminate information on human disturbance		
Review coastal and offshore development proposals		
Develop inter-agency network to maximize use of the sanctuary as a site for management oriented research and monitoring		
Collect and organize all existing data and studies relevant to sanctuary resources and prepare data atlas.		

RESOURCE PROTECTION

(A) General Context for Management

Designation of the Gulf of the Farallones National Marine Sanctuary has focused attention both regionally and nationally on the value of the marine resources of the area. Improved resource protection is an integral responsibility of the designation.

Presented in this section is a multi-faceted resource protection program that takes the form of:

- A set of marine resource regulations and policies including applicable laws and regulations administered by other agencies;
- Regular patrolling of highly sensitive areas within the sanctuary and enforcement "on the water" of applicable regulations;
- Emergency response and contingency planning procedures in the event of accidents that could affect sanctuary resources;
- Coordinated review and evaluation of proposed revisions to existing policies and regulations, proposed new activities, and new developments that could affect sanctuary resources;
- Information and monitoring network; and
- Dissemination of resource information to the public and other agencies.

This approach is consistent with the objectives for resource protection stated in Section 1 of the plan.

The resource protection program applies to the entire area of the sanctuary as described earlier. Sensitive habitats, concentration of resources, and heavily used nearshore areas will be given special attention for patrolling and monitoring. Preliminary priority areas have been identified in figure 14 by overlaying maps that illustrate areas of concentrations of seabirds and marine mammals, areas where there have been reports of visitor use disturbance, and heavily used areas.

(B) Regulations and Policies

The protective regulations that are now in effect within the sanctuary (15 CFR, Part 936) apply to the following:

Hydrocarbon operations: Hydrocarbon exploration, development, and production are prohibited except that pipelines related to operations outside the sanctuary may be placed at a distance greater than two nautical miles from the Farallon Islands, Bolinas Lagoon, and Areas of Special Biological Significance where certified to have no significant effect on sanctuary resources.

Discharges: Discharges are prohibited within the sanctuary with the exception of fish wastes and bait; water (including cooling water) and other biodegradable effluents incidental to vessel use in the sanctuary (generated by marine sanitation devices, routine vessel maintenance, etc.); and dredge material disposed at the dumpsite (ten nautical miles south of the southeast Farallon Island) and municipal sewage.

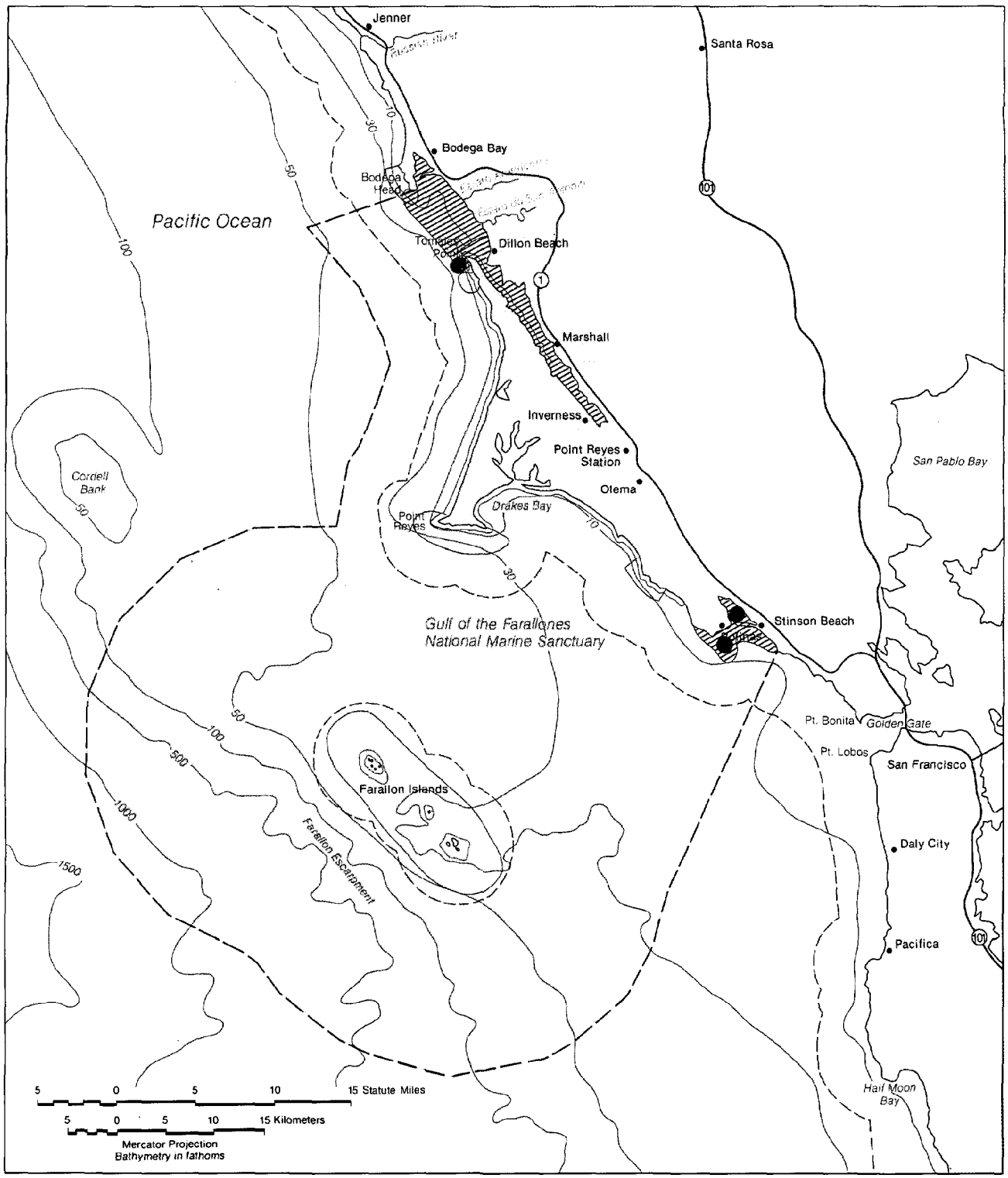
Alteration of, or construction on the seabed: Seabed alteration or construction is prohibited within the sanctuary except in connection with the laying of pipelines; construction of an outfall; anchoring vessels or bottom trawling from a commercial fishing vessel, except routine maintenance and navigation; ecological maintenance; mariculture; and the construction of docks and piers in Tomales Bay.

Commercial vessel operations: Access for fishing, recreational, and research vessels is not restricted within the sanctuary. Other vessels such as those engaged in carrying cargo or servicing offshore installations are prohibited within two nautical miles of the Farallon Islands, Bolinas Lagoon, or any Area of Biological Significance, except to transport persons or supplies to or from an island or mainland areas adjacent to sanctuary waters.

Overflights: Aircraft are not permitted below 1,000 feet within one nautical mile of the Farallon Islands, Bolinas Lagoon, or any Area of Biological Significance. This restriction will minimize disturbance to marine mammals or seabirds. Exceptions to this restriction are provided for enforcement purposes.

Removing or damaging historical or cultural resources: Removal of and/or damage to any historical or cultural resources of the sanctuary are prohibited.

NOAA General Counsel's Southwest Regional Office and Marine and Estuarine Management Division on-site managers have identified the need to revise and refine these regulations to facilitate on-site enforcement (Stone, pers. comm.). Changes are being considered to clarify the marine mammal/overflight regulation, dumping of fish and fish parts, and a better definition of historical and cultural resources. Additional revisions to the regulations may be required as on-scene experience is gained in reporting violations and writing citations. In addition to these sanctuary regulations, there are several regulatory programs administered by other agencies that apply to the National Marine Sanctuary. An objective of the sanctuary resource protection program is to encourage recognition and compliance with these regulations.



Gulf of the Farallones National Marine Sanctuary Boundary

Areas of Overlapping Concentrations of Marine Resources

Heavily Used Areas

Impacted Areas

Figure 14

Priority Areas for Resource Protection

Other important Federal, state, and local regulations and policies that apply to the management of a sanctuary resource (such as marine mammals) or to the management of a specially designated area within the sanctuary are summarized in Appendices 6, 7, and 8. Collectively, these existing policies and regulations are the foundation for making future decisions concerning priorities for surveillance and enforcement, compatible future uses of the sanctuary, and development within the sanctuary and in adjacent coastal areas.

Regulations and policies are applied to the sanctuary's resource protection program in various ways including:

- Surveillance and enforcement
- Public information
- Review of development proposals

Each application is discussed further below.

(C) Surveillance and Enforcement

In consultation with the California Department of Fish and Game and the NOAA Office of General Counsel, the Marine and Estuarine Management Division may identify the need to formulate operational procedures for enforcing sanctuary regulations. Such procedures could include a formal interpretation of each regulation and governing matters of policy, and contact, warning, citation, and legal procedures where appropriate. This information could be assembled in an operational manual for the training of wardens and rangers. If deemed necessary the Marine and Estuarine Management Division and the California Department of Fish and Game would jointly administer this initiative.

Implementation of the surveillance and enforcement program entails the following activities:

Planning and Coordination of Surveillance and Enforcement Activities

Under a cooperative agreement with the Marine and Estuarine Management Division, the California Department of Fish and Game (and other Federal agencies including the National Park Service, the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service) enforces living marine resource regulations within the sanctuary and is deputized to enforce sanctuary regulations. Planning of enforcement activities requires the establishment of patrol schedules, and the assignment of vessels and staff to specific parts of the sanctuary.

As new information becomes available on visitor use patterns, frequently occurring violations, and potential conflicts with sensitive resources, surveillance operations will need to be adjusted to respond to priorities. This will entail periodic meetings of the Sanctuary Manager, the California Department of Fish and Game, the National Park Service, the National Marine Fisheries Service, and the U.S. Coast Guard to review and adjust schedules and assess the adequacy of the enforcement capability.

In addition to clearly established priorities, several other factors will determine whether enforcement goals for the sanctuary are met. For example, it will be important to develop an increased capability for quick response to enforcement of oil spill situations on the water by having appropriately equipped vessels.

Training of Surveillance and Enforcement Staff

By virtue of consistent training programs, the California Department of Fish and Game enforcement staff are adequately prepared to enforce regulations and operational procedures within the sanctuary. The Marine and Estuarine Management Division and Sanctuary Manager will assist the California Department of Fish and Game in the continuing development of these programs. Similar programs may be developed for National Park Service rangers once they become deputized to enforce sanctuary regulations.

Reporting and Analysis of Trends

Soon after the submission of this plan, surveillance and enforcement reporting procedures will be refined. The Sanctuary Manager, the State Sanctuary Warden, and the Southwest Regional Office of General Counsel will determine relevant summary statistics, a reporting format for the sanctuary, and reliable methods for monitoring the effectiveness of surveillance and enforcement of various activities in different parts of the sanctuary.

All violations of sanctuary regulations will be documented, with NOAA's Office of the General Counsel making the decision of whether to prosecute. Monthly, quarterly, and annual reports of all surveillance and enforcement activities (including the nature and number of incidents) in the sanctuary will be prepared by the California Department of Fish and Game and submitted to the Sanctuary Manager, Marine and Estuarine Management Division, and the Southwest Regional Office of General Counsel. The information in these summaries should be formatted such that trends in violations and the effectiveness of the overall surveillance and enforcement program can be assessed.

The Sanctuary Manager and the Sanctuary Warden maintain a record of all warnings, citations, and summary statistics. Significant violations will require consultation with the NOAA Office of General Counsel and the Marine and Estuarine Management Division, Washington, D.C. office.

Public Education and Information

The most effective measures in law enforcement are preventive. It is therefore essential that recreational visitors and users of the sanctuary be provided with complete and easily understood information about marine resource regulations, the reasons for them, and the shared government responsibility for their enforcement. In time, a directed information program could alleviate many resource management concerns such as disturbance of marine mammals and illegal discharges.

The first initiatives to be undertaken include: (1) developing and distributing a brochure or brochures explaining sanctuary regulations and their intent; (2) posting sanctuary regulations in appropriate locations (i.e., marinas, sailing clubs, local airports); and (3) establishing contact with industry, and recreational and commercial groups (i.e., fishing, shipping industry). Discussion with various groups will serve in determining appropriate educational materials for promoting compatible use of the sanctuary. This initiative will be administered by the Sanctuary Manager with the assistance of the National Park Service and the California Department of Fish and Game.

(D) Contingency Plans for Major Emergencies

The resources of the Gulf of the Farallones National Marine Sanctuary are vulnerable to changes from both natural and human-related events. Many of the changes are gradual and can be detected only through long-term monitoring of various environmental and biological indicators. Certain sudden changes in conditions, however (due to an accidental spill, for example) could seriously injure resources and present severe health and safety hazards. While major accidents adjacent to or within the sanctuary cannot be predicted, there is a need for a state of readiness to avoid long-term and widespread damage.

Measures and plans are currently in place within the region to respond to an offshore emergency such as a major accidental oil spill. The U.S. Coast Guard, in cooperation with the Environmental Protection Agency, administers the *National Oil and Hazardous Substances Pollution Contingency Plan*. This plan includes: 1) the duties and responsibilities of each Federal agency in coordination with state and local agencies; 2) a strike force (i.e., the Pacific Strike Team) of trained personnel available to provide the earliest possible alert to a discharge; 3) a system of surveillance to provide the earliest possible notice of a discharge; 4) a national center to coordinate the plan; 5) and procedures and techniques for identifying, containing, and removing the discharge or dispersing it.

In the San Francisco Bay region that includes the sanctuary, the Coast Guard Marine Safety Office is the Federal office designated to coordinate and direct Federal responses to oil spills. Decisions are coordinated with a Regional Response Team (RRT) that includes representatives from the Coast Guard, Environmental Protection Agency, the National Oceanic and Atmospheric Administration, the Department of the Interior, and the State of California (represented by the Department of Fish and Game). The RRT is responsible for responding to and planning courses of action in the event of environmental emergencies such as oil spills.

Clean Bay is a private oil spill cleanup cooperative that operates in the San Francisco Bay area. Other private non-profit organizations such as the International Bird Rescue Center and the Marine Mammal Center have facilities for rehabilitating oiled birds and marine mammals.

Emergency response to the T/V *Puerto Rican* incident in November, 1984 provided an opportunity to evaluate existing capabilities within the sanctuary. Approximately 25,000 to 35,000 barrels of petroleum products (mainly lubricating oils) were discharged on November 3, 1984 within the southern boundary of the sanctuary. The resulting oil slick traveled south and then northeast, reaching the Farallon Islands, the Point Reyes Peninsula, and washing ashore at Bodega Harbor. The NOAA report entitled, *Resource Damage Assessment of the T/V Puerto Rican Oil Spill Incident*, provides a detailed analysis of damages to natural resources and the associated costs and values. Based on this experience, the Marine and Estuarine Management Division has identified the need for:

- Closer coordination with the Coast Guard, the Regional Response Team, and local cooperatives
- Developing a set of response procedures applicable to Marine and Estuarine Management Division staff and on-site sanctuary staff

To meet these needs, an emergency response and contingency plan will be prepared for the sanctuary. The plan will:

- Streamline procedures for gaining emergency access to baseline information on sanctuary resources.
- Describe emergency response procedures for Marine and Estuarine Management Division staff and requirements for coordination with other members of the Regional Response Team.
- Offer procedures for emergency research and monitoring of affected resources.
- Provide damage assessment guidelines.

In addition to preparing the plan, the Marine and Estuarine Management Division will assess and monitor the emergency response capability within the sanctuary.

(E) Encouraging Compatible Use in the Sanctuary

Encouraging the public to use the sanctuary in ways that are compatible with the protection of resources is an important aspect of this program. Sanctuary management does not embrace direct management of activities (other than that provided through the regulations stated above) since this is a responsibility assigned to other state and Federal agencies. The Marine and Estuarine Management Division does, however, encourage compatible visitor use by undertaking the following:

- Monitoring commercial and recreational activities in the sanctuary and/or encouraging other agencies to do so to detect areas of particular management concern;
- Exchanging information on commercial and recreational activities in the sanctuary;
- Reviewing and consulting with other agencies such as the National Marine Fisheries Service, the Pacific Fisheries Management Council, the Environmental Protection Agency, Minerals Management Service, U.S. Army Corps of Engineers, the State Lands Commission, and the California Department of Fish and Game on policies or permit approvals for activities that affect sanctuary resources;
- Developing information brochures and other materials aimed at informing the public about potential disturbance of significant resources, and where and when the resources are vulnerable to disturbance.

RESEARCH

(A) General Context for Management

A well-designed research program at this sanctuary can improve our understanding of resources and point out species sensitive to disturbance. The information obtained from a directed research program can suggest improved or new regulations, and in time increase the capability for managing resources. Research results can help the Sanctuary Manager and staff detect changes in populations and understand the significance of these changes for the system. Research projects are a continuing source of information for interpretation and education activities within the sanctuary.

Research conducted within the sanctuary and funded by the Marine and Estuarine Management Division will continue to focus on management issues that relate to the protection of significant resources. Research will typically examine questions involving communities or whole ecosystems though occasionally it may be species-specific. General directions and priorities for additional research are provided in this section as a guide for identifying and selecting future research projects.

(B) Topical Directions

Research projects at the sanctuary will be directed to three basic management questions as follows:

- What are the general characteristics and distributions of species and marine communities (baseline/characterization)?
- What are the short- and long-term changes in species' populations and marine communities (i.e., in abundance, distribution) and what are the influences of natural variability and human-caused disturbances on these changes (monitoring)?
- What are the possible cause-and-effect relationships accounting for changes observed in resource distribution, abundance, and diversity (experimental/predictive)?

Research in several categories has been undertaken in the sanctuary to date. A listing of past and ongoing research projects is provided in Appendix 2. Since the designation of the sanctuary, the emphasis has been on assessments of various populations including harbor seals and other pinnipeds, aquatic birds, and invertebrates. Future directions and known priorities falling under each of the three categories are described in more detail below.

Baseline Studies

Baseline studies are designed to obtain a basic understanding of the resources in the sanctuary. They generally refer to studies of the abundance, distribution, and movement of species. As described earlier in the plan, elementary characteristics of many important populations are still not known. This is generally true for cetaceans, fish, subtidal invertebrates, and algal flora. Inventories of selected species, particularly threatened or vulnerable species within these populations, represent an important direction for research. Some baseline studies will also focus on the inventory of habitats (as opposed to focus on populations). Over the long term, there may also be a need for a detailed inventory of the intertidal and subtidal habitats of the sanctuary that build on the surveys already conducted for other Federal agencies.

Monitoring

Monitoring studies are fundamental to the successful management of marine resources. By regularly recording the abundance of organisms or the diversity of a community, for example, it is possible to detect ecological change. A good monitoring data base can help detect normal or natural cycles and trends as well as unusual changes and possibly relate them to one or several sources of disturbance. Over the long term, a monitoring program should provide an indication of the health of the important populations within the sanctuary as well as the health of the overall system.

Marine resource monitoring programs are costly and their design can be complex. For these reasons, the selection of what to monitor is an important management and scientific question. The Marine and Estuarine Management Division will continue to work with other agencies carrying out monitoring in the ocean, providing technical and other support where possible. Additional monitoring programs may also be initiated for important species on habitats of special concern not covered by an existing program.

Analysis and Prediction

Analytical and predictive studies are needed to determine the causes of changes in the ecosystem or to predict the effects of change. Examples of such studies undertaken for the sanctuary have been studies of premature pupping in northern sea lions on the Farallon Islands and a study of human disturbance on harbor seals. Such in-depth studies will continue to be a means of focusing on specific management issues with the aim of providing suggestions for improved ed regulations, surveillance, and public information. The following points should be considered when developing a scientific research plan:

- Develop or update a list of management concerns facing the sanctuary, together with supporting evidence or rationale. The management concerns should be prepared in accordance with sanctuary goals.
- Based on the list of management concerns, prepare a list of research priorities. Research priorities are established by the Sanctuary Manager, in cooperation with the Marine and Estuarine Management Division.

The most important factors to be considered in establishing annual research priorities will be the following:

(1) immediate or evolving management issues that may be resolved through directed research projects;

(2) the prospects of research already in progress; and

(3) the availability of funds, instruments, and equipment for research support.

- Formulate general concepts for research projects. At this stage, the intent is to identify the type of research action that effectively addresses the management concern.
- Prepare and circulate a research announcement. The announcement discusses the management concerns, and summarizes past and ongoing research. The purpose is to solicit suggestions for research that can help resolve management issues. Research workshops will be held occasionally to facilitate the formulation of research problems.
- Based on research suggestions from the announcement, workshop or related means, a draft Sanctuary Research Plan (SRP) is prepared. The SRP lists the proposed research projects with a rationale. The list is priority-ranked by the Sanctuary Manager.
- The draft SRP is sent to the Marine and Estuarine Management Division and also circulated for review to selected reviewers.

• Prepare a final SRP. This SRP includes documentation of how each project meets national selection criteria. The final SRP is sent to the Marine and Estuarine Management Division where it is compiled into a National Sanctuary Research Plan. From the national SRP, the highest ranking research projects are selected and a procurement schedule is prepared.

The Sanctuary Research Coordinator, the Sanctuary Manager, and the Marine and Estuarine Management Division will adjust research priorities as new management issues emerge and existing ones are resolved. The formulation and ranking of specific research topics will be undertaken annually in accordance with national guidelines (see below).

(C) Guidelines for Management of the Research Program

To ensure that projects funded by the Marine and Estuarine Management Division are relevant and directed to the resolution of management questions and issues, the Sanctuary Manager will follow general procedures that have been developed to administer the research program at the national level. These procedures relate to: (1) preparing an annual Sanctuary Research Plan; (2) monitoring the progress of research in the sanctuary; and (3) maintaining an information management and exchange program.

Preparing an Annual Research Plan

A research plan will be prepared for the sanctuary each year and incorporated into a National Research Plan that includes the annual plans for each national marine sanctuary.

In summary, the criteria for including research projects in the final SRP for the sanctuary are:

• The topic clearly addresses one or several priorities for sanctuary management.

• The end products of the research can be used for several aspects of sanctuary management such as the preparation of education materials, contingency planning, and information exchange with other agencies.

• The research addresses an acknowledged information gap for the area.

The SRP is intended to meet several functions as follows:

• Provide the basis for establishing budget requests and annual plans.

• Structure research products along lines that will permit more effective sanctuary management decision making.

• Allow more complete analysis of significant regional issues in a schedule timely for decision making.

• Provide for contact with other information user groups and public participation in planning sanctuary activities.

Monitoring Progress

The Sanctuary Manager will monitor the performance of research projects and keep the Marine and Estuarine Management Division informed of progress. Progress reports and final reports will be required as outlined under the terms of each contract. Final reports may also be reviewed by recognized scientists and resource managers and approved by the Marine and Estuarine Management Division. Outstanding projects may be published by the Marine and Estuarine Management Division in its Technical Report Series. The Sanctuary Manager will also keep records of all research underway, sites in use, and progress to date. There will also be a systematic attempt on a regular basis (two to three years) to evaluate the performance of the overall research program to determine its effectiveness as a management tool.

The Marine and Estuarine Management Division will also receive requests for research permits. When proposed projects include activities that are prohibited by sanctuary regulations, it may be determined that all or part of the activity should be conducted outside the sanctuary. Areas containing special resources protected under state or Federal statutes (i.e., state ecological reserves, endangered species, marine mammals) may require additional research permits from other agencies.

(D) Additional Requirements of the Research Program

Direct Marine and Estuarine Management Division funding for research is relatively limited. To complement directly funding research, the Marine and Estuarine Management Division will encourage research funding from other sources, particularly where it complements sanctuary management. To achieve this objective, the Marine and Estuarine Management Division will make available to other agencies and private institutions current sanctuary resources data obtained from past and ongoing research projects. It may be possible to design a simple data storage system that would allow for rapid access of current and historical population data.

The Marine and Estuarine Management Division will also investigate the possibility of establishing an information network that would allow access to existing monitoring data bases that cover the sanctuary. The network could include:

- Mussel watch program data;
- National Ocean Service data on currents and marine weather;
- California Department of Fish and Game fisheries data;
- A variety of marine species distribution data bases maintained by the Point Reyes Bird Observatory, the University of California at Santa Cruz and Davis, and government agencies.

INTERPRETATION AND EDUCATION

(A) General Context for Management

As the National Marine Sanctuary Program gains a more prominent role as a marine resource protection program in the Gulf of the Farallones, the general public of the San Francisco Bay area will need more information about the site and what the Marine and Estuarine Management Division is doing to protect its resources. The Division can meet this growing need for information through a carefully planned education and interpretation program. As is currently required for research, educational activities for the sanctuary can be well integrated with other aspects of sanctuary management. Over time, such a directed program can lead to active public support of sanctuary goals, increased program coordination, and ultimately better management of the site.

In recognition of the role of interpretation and education in achieving resource protection goals, the Marine and Estuarine Management Division has initiated programs over the past three years in collaboration with the National Park Service and other agencies. Initiatives administered by the Division include:

- The design, production, and distribution of a sanctuary brochure;
- The design and production of sanctuary wayside signs;
- Contacts, coordination, and cooperative programming with local organizations offering interpretive activities;
- A lecture series and major symposia; and
- Ranger-naturalist orientation to the sanctuary.

Through a cooperative agreement with the National Park Service, the Marine and Estuarine Management Division has also undertaken joint initiatives with the National Park Service at the Point Reyes National Seashore and the Golden Gate National Recreation Area. The sanctuary public office is located at the Fort Mason headquarters for the Golden Gate National Recreation Area. Sanctuary staff plan for and carry out most interpretive and educational and other management activities from this location. The Division has also funded ranger-naturalists from the Point Reyes National Seashore Area to give interpretive talks on the sanctuary at different locations overlooking the sanctuary.

The *Education and Interpretation Plan* (NOAA 1984c) prepared for the Marine and Estuarine Management Division by the Point Reyes Bird Observatory reviews and evaluates the broad range of educational opportunities available for the sanctuary. The plan includes a list of potential interpretive projects and is currently providing direction for the implementation of education activities for the sanctuary. Many of the projects can be undertaken jointly with organizations that have extensive community networks in Marin and Sonoma counties and the San Francisco Bay area.

The purpose of this section is to incorporate into the sanctuary's management plan the major recommendations of the *Education and Interpretation Plan*, highlight additional issues that relate to education, and propose a strategy that extends into the future.

(B) General Policies and Guidelines

In addition to general goals and objectives (Section 1), specific projects will follow general policies to ensure high quality of materials and programs (NOAA 1984c):

- Interpretation efforts should emphasize the entire sanctuary as a regional unit.
- Interpretive activities should be integrated with other aspects of sanctuary management and relate directly to resource protection activities and priorities.
- Interpretation should be balanced over the entire domain of the sanctuary where feasible, given limited funds and staff.
- Current issues in protection should be addressed as well as timeless principles of marine physical and biological processes and maritime cultural history.
- Collaboration among organizations should be encouraged in the implementation of interpretive projects to broaden sanctuary support and create a marine education network.
- Local residents and organizations should be actively considered and involved in education programs to encourage supportive relations and enthusiastic participation.

• Education should focus on developing widespread support for the sanctuary and the oceans; target audiences are public officials, educators, and environmental groups.

• Each interpretive effort is a showcase for the sanctuary and the entire National Marine Sanctuary Program; each must be carefully thought out, developed through cooperative efforts with a view to the objectives of the overall program.

(C) Strategy

Because the program is relatively new, interpretation and education projects will be phased as follows:

• First one to two years: Broad-level public outreach to develop basic awareness of the sanctuary, its ecological significance, current and planned resource protection activities, and the National Marine Sanctuary Program. The emphasis will be on orientation to the site, explaining the program, and characterizing sanctuary resources;

• Next three to five years: Specific activities and materials that address more specialized needs;

• Next six to ten years: Implementation of some large-scale projects and review and evaluation of the program as a whole to assess effectiveness and determine direction for the future.

Long-term Scope of the Interpretive and Education Program

At this time, the program is relatively small in scope with limited funds and staff. It is therefore critical to collaborate with agencies such as the National Park Service that have qualified staff, good facilities, and exhibit space. The development of joint programs is likely to continue, but there is a need to consider if and how the sanctuary's program can expand gradually over the next three to five years. The issue of expanding on-site educational services is considered important at the national level. The National Marine Sanctuary Program is shifting from an intensive period of planning and program design towards one of accelerated implementation of proposals that increase the prominence and identity of the sites.

Developments are occurring at other designated sites that illustrate some of the changes that could take place at the Gulf of the Farallones National Marine Sanctuary over the next decade. For example, proposals for various types of interpretive signs, exhibits, audio-visual presentations, and cooperative interpretive centers are being carried out at other sanctuaries.

While there are many direct benefits to these types of activities, there is a concern for not interfering with the primary focus of the program (resource protection) by overextending limited funds and resources. The need to evaluate the real contribution of different types of educational services to resource protection is a related concern. Many experts are now stressing the evaluation component of visitor services and are calling for quantitative techniques to assess the value of interpretive activities and facilities as a management tool.

(D) Programs

Printed Materials

Printed materials address two important issues for the sanctuary: identity and compatible visitor use. Printed materials include brochures, posters, and newsletters. These are essential for the interpretation and education program because:

• They can be used during both on-site tours and off-site talks.

• They can be disseminated over large areas to reach a variety of regional or national audiences.

• Visitors can keep them for future reference.

Three additional notes need to be made about printed materials. First, brochures that deal with some aspect of the sanctuary are already available and new materials should stress the unique aspects of the program to support the National Oceanic and Atmospheric Administration's objective of avoiding duplication. Second, there should be some consistency in the appearance of printed materials. The design of printed materials for the sanctuary should follow the national-level graphic design guidelines for the use of the sanctuary logo, color, and sizes, etc. The "National Marine Sanctuaries: industrial and Graphic Design Guidelines" (NOAA 1985b) should be kept on file at the Sanctuary Manager's office and used as a guideline for developing and updating the items discussed below. The visual continuity ensured by the standards can help promote the identity of both the sanctuary and the program. Third, the success of printed materials depends on effective distribution. An up-to-date mailing list and a network of local contacts needs to be maintained to help in distribution.

In the earlier years, priority will be placed on basic orientation materials. These will include:

• A general purpose sanctuary brochure with a good quality map of the site and an introduction to the concept of the entire sanctuary. A detailed map with keyed diagrams and photographs is most effective for orienting visitors without requiring that they read lengthy copy;

• High-quality sanctuary posters to be used for promotion;

- Updating of existing brochures being distributed by other agencies so that mention is made of the sanctuary (in preparation);
- A low-cost newsletter providing an update of sanctuary research activities, upcoming events and seminars;
- Stationery designed to include new sanctuary identity;
- Press packages (including brochures, articles);
- Training materials.

In the later years (after two to five years), the focus will shift to the development of specific purpose and specific topic materials such as:

- Resource-specific or habitat-specific brochures. A series of low-cost brochures dealing with significant sanctuary resources or habitats. Topics could include whales, seabirds, seals, and sea lions;
- School information packages on the sanctuary to be distributed to local schools and incorporated into the curriculum. The package could include a combination of brochures, as well as suggestions for school outings and experiments. This could be developed in collaboration with local universities and schools;
- Additional curriculum materials for teacher and guide training programs and local media;
- Guides relating to the marine environment to be used along existing coastal trails;
- Press releases, occasional announcements of special events in the sanctuary, or feature articles circulated to local media and nature club newsletters;

Personal Contact Interpretation

Personal contact involves the use of government and volunteer staff to undertake sanctuary walks and outreach talks. Staff time available for interpretive walks in the sanctuary is limited; however, such services will be expanded gradually over the next few years by training others including National Park Service Ranger-naturalists and county naturalists to conduct interpretive talks and work with visitor groups in a variety of locations. The Sanctuary Manager and Deputy Sanctuary Manager may give occasional talks and will assist with the training of the Service's staff and other collaborating agencies in sanctuary interpretation. The Sanctuary staff will also direct interpretive programs and work to establish a volunteer naturalist program.

Other personal contact projects recommended in the first one to two years are:

- Continuation of the "Lecture Series";
- Annual events including tours;
- Symposiums (professional training workshops) and appearances at other seminars organized by other agencies.

Recommended projects to be implemented at a later date include:

- Volunteer programs;
- School outreach programs;
- Site-specific support such as additional on-site tours and signage at the main vantage points overlooking the sanctuary.

Signage and Exhibits

These include indoor and outdoor exhibits and a variety of audio-visual presentations. The notes made concerning printed materials also apply in this case: (1) efforts should be made to avoid duplication; (2) designs should be consistent, of high quality and vandalism-proof; and (3) efforts should be made to use local resources to raise funds for, develop, and install exhibits.

The development of on-site outdoor signage (including wayside exhibits) is an important element of the interpretation program because it provides a clear indication of the sanctuary's geographic extent. Such signage is generally costly, however, and since it is subject to weather exposure and vandalism, it requires maintenance. Refer to the report "National Marine Sanctuaries: Industrial and Graphic Design Guidelines" (NOAA 1985b) for specific details regarding the approved National Marine Sanctuary Program standards for signage systems.

The development of signage and exhibits for the sanctuary will entail the following projects over the short term (NOAA 1984c):

- Basic sanctuary wayside exhibit and directional signs that identify the name of the sanctuary. Already located at Doran Beach, Drakes Beach, Limantour Beach, Cliff House, Point Reyes Headlands, and Stinson Beach. Recommendation that design be changed and additional signs sited at Muir Beach Overlook, Fort Point, Bodega Head, Fort Funston, and Half Moon Bay;
- Permanent indoor exhibits to be available for the Point Reyes National Seashore, Marin Headlands, and Cliff House areas of GGNRA;
- Sanctuary sign at the Fort Mason headquarters;
- A series of habitat-specific wayside exhibits each interpreting a different part of the sanctuary. These could be designed so as not to interfere with visual access and could be located at strategic points within and overlooking the sanctuary;
- Small portable exhibit for use at local conferences and fairs;
- A general traveling exhibit of the sanctuary with components of the exhibit devoted to the overall sanctuary. This could be developed at relatively low cost using the graphic art work and map designed for the sanctuary brochure;
- A slide/tape program on the sanctuary with text, slides, and narration for use in staff presentations or public outreach;
- A film on the Gulf of the Farallones available for both public television and education outreach;
- A series of brief video films focusing on the behavior of various significant sanctuary resources (e.g., pinnipeds, seabirds, whales). Need to determine if these would be undertaken as a research project and where they could be viewed;
- A collaborative interpretive plan to be implemented at the Point Bonita interpretive center.

Media

Local media coverage is an important and relatively inexpensive way of providing information to large numbers of people. Several local newspapers have already provided coverage on the sanctuary and this should continue and expand.

Ideas that can be implemented over the short term include (NOAA 1984c):

- Press package of information about the sanctuary;
- Detailed publicity for any program/lecture series;
- Developing ongoing relationships with local environmental reporters;
- News media tours of the sanctuary by boat on a systematic and regular basis;
- Involving legislators in sanctuary-related issues to build political support;
- Regular publicity of sanctuary-related events and topics through news articles, press releases, radio spots, and television coverage;
- Development of brief articles on the sanctuary for publication in local media;
- Sanctuary newsletter to interpret research and resource protection and provide a regular report on sanctuary activities; consistency in publication indicates commitment and stability in the organization;
- Encourage freelance writing by sending writers printed materials on the sanctuary;
- Short news articles for newsletters of organizations of marine interest groups;
- Public service radio and television spots featuring the sanctuary;
- Transit posters on city bus systems and ferries to promote the sanctuary;
- Development of promotional materials such as T-shirts, posters, bumperstickers, caps and decals using the approved National Marine Sanctuary Program logo.

(E) Facility Development

Sanctuary Headquarters

The general public, private organizations and special groups need one reliable contact point within the broad sanctuary "region" (i.e., San Francisco Bay, Marin County, Sonoma County) where they can visit and/or obtain more information about the sanctuary. A sanctuary headquarters is also required for the operation of an interpretive program. At this time and in the next few years, the headquarters will be an office with adequate space to store and distribute information materials, to display announcements concerning the sanctuary, to conduct meetings, to welcome visitors, and to administer the program.

The public contact role of the sanctuary headquarters presently is limited. The premises are used primarily as offices. Some of the recommendations that could be implemented in the next few years would be:

- Installing a sanctuary name sign outside the GGNRA headquarters office;
- Setting aside a room as a reference library;
- Having a permanent sanctuary exhibit installed at the headquarters.

Investigating the Need for a Visitor Facility

The *Final Environmental Impact Statement* (NOAA 1980) mentions the possibility of a visitor center for the sanctuary. To date, the sanctuary has had only wayside signs and the recommendation of permanent exhibits at the Point Reyes National Seashore and the Golden Gate National Recreation Area facilities. There is a need to investigate whether a building or part of a building devoted to sanctuary exhibits is warranted, and if so, the requirements of such a facility.

Several options could be considered including the following:

- Occupying a building or part of a building either at Fort Mason or another appropriate Golden Gate National Recreation Area location such as part of a facility at the Point Bonita Lighthouse;
- Occupying a building at the Point Reyes National Seashore. There is a small building near the Point Reyes Lighthouse that could be restored and modified to accommodate sanctuary exhibits (Sansing, pers. comm.);
- Reviving the "Marine Learning Center" proposal.

Factors that need to be considered in deciding if a facility is required include:

- Need for greater visibility in a coastal location adjacent to the site;
- Forecasted increases in contacts;
- Available staff to operate a satellite facility;
- Costs.

Four

Gulf of the Farallones
National Marine Sanctuary

ADMINISTRATION

ADMINISTRATION

ADMINISTRATIVE FRAMEWORK

Management of the Gulf of the Farallones National Marine Sanctuary encompasses three types of activities and programs — resource protection, research, and interpretation and education. The administrative framework ensures that all management activities are coordinated and identifies who is responsible for implementing specific programs.

The Marine and Estuarine Management Division of the National Oceanic and Atmospheric Administration, Department of Commerce, is responsible for overall management of the sanctuary. The Division coordinates its on-site activities and cooperates with the California Department of Fish and Game and the Western Regional Office of the National Park Service including the Golden Gate National Recreation Area and the Point Reyes National Seashore. These agencies participate in sanctuary management according to cooperative agreements with the Marine and Estuarine Management Division. The general administrative role of each agency for management of this sanctuary is as follows.

Marine and Estuarine Management Division

The National Marine Sanctuary Program is administered by the Marine and Estuarine Management Division. Program regulations require that the Division prepare a management plan for the sanctuary to ensure that proposals for resource protection, research, interpretation and education are coordinated and consistent with sanctuary goals and objectives. The Marine and Estuarine Management Division is responsible for implementing this plan through funding of on-site operations and interagency agreements.

The Marine and Estuarine Management Division in Washington, D.C., in collaboration with the Sanctuary Manager, develops an annual budget setting out expenditures for program development, operating costs, and staffing. Funding priorities are reviewed and adjusted annually to reflect evolving conditions in the sanctuary and overall National Marine Sanctuary Program priorities and requirements. The Marine and Estuarine Management Division in Washington, D.C. is also responsible for establishing policies and procedures in response to specific issues in the sanctuary. The complete set of responsibilities held by this office is detailed under resource protection, research, and interpretation and education in Appendix 5.

The Sanctuary Manager represents the Marine and Estuarine Management Division at the sanctuary. The Manager is responsible for liaison with other Federal and state agencies responsible for some aspect of sanctuary management and implementation of education and resource protection projects. The Manager's headquarters are located at Fort Mason, San Francisco. Specific responsibilities of the Sanctuary Manager and his/her staff are outlined in Appendix 5.

National Park Service

Through an interagency agreement with the Marine and Estuarine Management Division, the Western Regional Office of the National Park Service provides administrative services, logistical support and coordinates activities between the sanctuary, the Golden Gate National Recreation Area and the Point Reyes National Seashore. As part of this agreement a Deputy Sanctuary Manager was appointed through the Golden Gate National Recreation Area.

The Marine and Estuarine Management Division also has an agreement with the National Park Service for interpretive services at the Point Reyes National Seashore. National Seashore interpreters carry out education programs at the Lighthouse and include the sanctuary in their discussions. The Point Reyes National Seashore Superintendent supervises and informs the rangers.

California Department of Fish and Game

The California Department of Fish and Game is responsible for the management of living marine resources in California (Fish and Game Code, Title 14 of the California Administrative Code). Management in marine areas is aimed at the conservation, maintenance, and utilization of living marine resources. This mandate extends throughout state waters of California, including the state waters' portion of the Gulf of the Farallones National Marine Sanctuary.

Through a cooperative agreement, the Marine and Estuarine Management Division has provided funds to the California Department of Fish and Game to enforce sanctuary regulations and to supplement its enforcement of living marine resource regulations within the sanctuary. The chief responsibility for carrying out on-site enforcement rests with a Sanctuary Warden.

Other Agencies and Organizations

Many other Federal, state, and private non-profit organizations are involved in sanctuary management, some on an ongoing basis like the U.S. Fish and Wildlife Service, the U.S. Coast Guard, the National Marine Fisheries Service, and the California Coastal Commission (see Section 2). There may be a requirement in the future to develop additional formal agreements with these organizations to undertake cooperative research, joint monitoring programs, and similar activities.

Appendices

Gulf of the Farallones
National Marine Sanctuary

APPENDICES

APPENDIX 1:

SANCTUARY SITE COORDINATES
GULF OF THE FARALLONES NATIONAL MARINE SANCTUARY

This is an updated listing of the turning points of the Gulf of the Farallones National Marine Sanctuary. This listing is to be used in concert with the 2nd Revision Map of said sanctuary.

An appropriate description of the boundary is as follows: The boundary initializes at the most southerly point of Bodega Head, thence through a series of points in straight line segments commencing with point #1 and ending with point #30, which is a point on the mean high water line at Rocky Point, thence in a Northwestern direction along the mean high water line to a point where it joins the seaward limit of the Point Reyes National Seashore, continuing to the point where the National Seashore limit line crosses the mean high water line in Tomales Bay, thence along the mean high water line of Tomales Bay and along the mean high water line of Bodega Bay and returning to the point of origin at Bodega Head. The seaward portion of the boundary is expressed by a series of turning points, which are as follows:

	DIGITIZED COORDINATES		PRACTICAL COORDINATES	
Pt. No.	Latitude	Longitude	Latitude	Longitude
01	38°15'50.349"	123°10'48.933"	38°15'50"	123°10'49"
02	38°12'36.338"	123°07'04.846"	38°12'36"	123°07'05"
03	38°09'57.033"	123°05'27.435"	38°09'57"	123°05'27"
04	38°08'26.872"	123°04'52.524"	38°08'27"	123°04'53"
05	38°07'42.125"	123°05'10.714"	38°07'42"	123°05'11"
06	38°06'08.017"	123°05'48.920"	38°06'08"	123°05'49"
07	38°05'26.765"	123°06'09.922"	38°05'27"	123°06'10"
08	38°04'44.587"	123°06'29.251"	38°04'45"	123°06'29"
09	38°03'54.439"	123°06'57.591"	38°03'54"	123°06'58"
10	38°03'07.527"	123°07'37.755"	38°03'08"	123°07'38"
11	37°59'32.425"	123°08'24.905"	37°59'32"	123°08'25"
12	37°59'22.344"	123°14'06.127"	37°59'22"	123°14'06"
13	37°57'31.931"	123°19'19.187"	37°57'32"	123°19'19"
14	37°54'16.943"	123°23'18.456"	37°54'17"	123°23'18"
15	37°50'05.522"	123°25'28.791"	37°50'06"	123°25'29"
16	37°45'33.799"	123°25'32.666"	37°45'34"	123°25'33"
17	37°41'20.351"	123°23'29.811"	37°41'20"	123°23'30"
18	37°38'01.053"	123°19'37.445"	37°38'01"	123°19'37"
19	37°36'04.665"	123°14'30.483"	37°36'05"	123°14'30"
20	37°35'30.191"	123°13'31.060"	37°35'30"	123°13'31"
21	37°33'47.197"	123°11'50.904"	37°33'47"	123°11'51"
22	37°31'12.270"	123°07'39.618"	37°31'12"	123°07'40"
23	37°30'29.706"	123°05'42.221"	37°30'30"	123°05'42"
24	37°29'39.287"	123°00'23.711"	37°29'39"	123°00'24"
25	37°30'34.337"	122°54'18.139"	37°30'34"	122°54'18"
26	37°31'47.784"	122°51'31.592"	37°31'48"	122°51'32"
27	37°34'17.533"	122°48'10.415"	37°34'18"	122°48'10"
28	37°36'58.627"	122°46'05.779"	37°36'59"	122°46'06"
29	37°39'59.303"	122°44'59.838"	37°39'59"	122°45'00"
30	37°52'56.355"	122°37'35.195"	37°52'56"	122°37'35"

APPENDIX 2

RECENT AND ONGOING RESEARCH PROJECTS FUNDED AT THE GULF OF THE FARALLONES NATIONAL MARINE SANCTUARY SINCE 1982

Research Projects Completed Since 1982

Intertidal and Subtidal Communities
Gordon Chan

Pinnipeds along the Point Reyes Coast
Sarah Allen and Harriet Huber

Assessment of Pinniped/Human Interactions
Sarah Allen

Aquatic Bird Abundance and Trophic Relationships
Gary Page et al.

Farallon Islands Seabird Ecology
David Ainley et al.

Marine Mammal Necropsy
Raymond Dieter

Premature Pupping in Northern Sea Lions
Harriet Huber

***Puerto Rican* Oil Impact-Invertebrates**
Gordon Chan

***Puerto Rican* Oil Impact-Invertebrates (Molluscs)**
University of California, Bodega Marine Laboratory

***Puerto Rican* Oil Impact-Marine Mammals**
Raymond Dieter

***Puerto Rican* Oil Impact-Aerial Surveys of Seabirds and Mammals**
Point Reyes Bird Observatory

White Shark Movements and Feeding Ecology
Peter Klimley

Harbor Seal Telemetry
Sarah Allen

Survey of Historic Shipwreck *San Agustin*
National Park Service

Diet and Distribution of Seabirds
David Ainley

Humpback Whale Distribution and Abundance Year 1
Cascadia Research Collective

Blue Whale Population Survey
Cascadia Research Collective

Radionuclide Concentration in Fish and Mussels
University of California, Davis

Northern Elephant Seal Colony at Point Reyes
Sarah Allen

Harbor Porpoise Survey
Isidore Szczepaniak

Explorations of Cordell Bank
Cordell Bank Expeditions

Resource Description of Cordell Bank
Robert Schmieder

Computer Mapping of Cordell Bank
Robert Schmieder

Ongoing Research

Seabird Mortality from Beached Bird Surveys
Point Reyes Bird Observatory

Humpback Whale Distribution and Abundance Year 2
Cascadia Research Collective

Harbor Porpoise Distribution and Abundance
Cascadia Research Collective

Tomales Bay Productivity Baseline
Tiburon Center for Environmental Studies

APPENDIX 3

AQUATIC BIRDS FOUND WITHIN THE GULF OF THE FARALLONES NATIONAL MARINE SANCTUARY

Non-breeding
Oversummering Individuals
- Common Loon
- Double-crested Cormorant
- Snowy Egret
- Black-crowned Night Heron
- Brant
- Greater Scaup
- Lesser Scaup
- Surf Scoter
- White-winged Scoter
- Red-breasted Merganser
- Black-bellied Plover
- Willet
- Whimbrel
- Long-billed Curlew
- Marbled Godwit
- Bonaparte's Gull
- Ring-billed Gull
- California Gull
- Western Gull
- Caspian Tern

Primarily Spring and Fall Migrants
- Cinnamon Teal
- Whimbrel
- Short-billed Dowitcher
- Red-necked Phalarope
- Red Phalarope
- Bonaparte's Gull
- Caspian Tern

Have Regular and Sizeable Winter Populations

Spring and Fall Migratory Peak
- Common Loon
- Surf Scoter
- White-winged Scoter
- Red-breasted Merganser
- Semipalmated Plover
- Black Turnstone
- Western Sandpiper
- Forster's Tern
- Sanderling

Fall Migratory Peak
- Western Grebe
- Double-crested Cormorant
- Mallard
- Killdeer
- Willet
- Least Sandpiper
- Dunlin
- Ring-billed Gull
- Mew Gull
- California Gull
- Western Gull

Spring Migratory Peak
- Brant

No Migratory Peak
- Pied-billed Grebe
- Horned Grebe
- Eared Grebe
- (American White Pelican)
- (Brown Pelican)
- Snowy Egret
- Black-crowned Night Heron
- Green-winged Teal
- Northern Pintail
- Northern Shoveler
- American Pigeon
- Canvasback
- Greater Scaup
- Lesser Scaup
- Common Goldeneye
- Bufflehead
- Ruddy Duck
- American Coot
- Black-bellied Plover
- Snowy Plover
- American Avocet
- Long-billed Curlew
- Marbled Godwit
- Long-billed Dowitcher
- Common Snipe
- Herring Gull
- Glaucous-winged Gull
- (Heermann's Gull)
- (Elegant Tern)

SOURCE: Page et al., 1984

APPENDIX 4

MARINE MAMMALS FOUND WITHIN THE GULF OF THE FARALLONES NATIONAL MARINE SANCTUARY AND THEIR STATUS AS RESIDENTS

Common Name	Genus/Species	Status
Pinnipeds:		
California sea lion	*(Zalophus californianus)*	year-round
Steller sea lion	*(Eumetopias jubatus)*	year-round
Harbor seal	*(Phoca vitulina)*	year-round
Northern elephant seal	*(Mirounga angustirostris)*	year-round
Northern fur seal	*(Callorphinus ursinus)*	transient
Fissiped:		
California sea otter	*(Enhydra lutris nereis)*	occasional visitor
Cetaceans:		
Blue whale	*(Balaenoptera musculus)*	transient
Sei whale	*(Balenoptera borealis)*	
California gray whale	*(Eschrichtius robustus)*	transient
Finback whale	*(Balaenoptera physalus)*	transient
Humpback whale	*(Megaptera novaengliae)*	transient
Pacific pilot whale	*(Globicephala machorhynchus)*	transient
Killer whale	*(Orcinus orca)*	transient
False killer whale	*(Pseudorca crassidens)*	transient
Sperm whale	*(Physeter catodon)*	transient
Baird's beaked whale	*(Berardius bairdi)*	transient
Cuvier's beaked whale	*(Ziphius cavirostris)*	transient
Common dolphin	*(Dellhinus delphis)*	transient
Risso's dolphin	*(Grampus griseus)*	transient
Pacific white-sided dolphin	*(Lagenorhynchus obliquidens)*	transient
Northern right whale dolphin	*(Lissodelphis borealis)*	transient
Harbor porpoise	*(Phocoena phocoena)*	year-round
Dall porpoise	*(Phocoenoides dalli)*	year-round

SOURCE: California Department of Fish and Game 1979.

APPENDIX 5:

MANAGEMENT ROLES AND RESPONSIBILITIES

The following section outlines in more detail the specific responsibilities of each agency participating in the management of the sanctuary:

RESOURCE PROTECTION

Marine and Estuarine Management Division

1. Assigns roles and responsibilities for surveillance and enforcement of sanctuary regulations through interagency agreements;

2. Monitors the effectiveness of interagency agreements for surveillance and enforcement of sanctuary regulations and institutes change where required;

3. Develops and negotiates interagency agreements for other aspects of resource protection including environmental contingency planning and visitor use management in the sanctuary;

4. Reviews quarterly and annual summary reports of surveillance and enforcement activities prepared by the California Department of Fish and Game; reviews bimonthly and semi-annual progress reports prepared by the Sanctuary Manager;

5. Evaluates progress towards management objectives for resource protection with the Sanctuary Manager and Sanctuary Warden and adjusts annual priorities accordingly; and

6. Monitors the effectiveness of existing sanctuary regulations and considers and enacts changes where necessary.

Sanctuary Manager and Staff

1. Makes recommendations to the Marine and Estuarine Management Division for changing priorities and policies for resource protection and indicates how these may affect implementation;

2. Assists in the coordination of surveillance and enforcement activities in the sanctuary by providing liaison between the National Park Service, the California Department of Fish and Game, and the U.S. Coast Guard;

3. Reports regularly to the Marine and Estuarine Management Division on surveillance and enforcement activities, violations and emergencies; as part of this responsibility, recommends in consultation with the California Department of Fish and Game, changes in regulations, and interagency agreements (i.e., relating to patrol methods or enforcement procedures) to enhance resource protection;

4. Develops in cooperation with the California Department of Fish and Game and the Marine and Estuarine Management Division an operational plan for resource protection. The operational plan is intended as a working manual that can be referred to on a daily basis for relevant policies concerning significant resources, detailed permitting and enforcement procedures, and emergency response procedures;

5. Provides information for use in training sanctuary wardens and rangers as applicable;

6. Develops and distributes educational material aimed at improved public awareness of and voluntary compliance with sanctuary regulations;

7. Monitors and evaluates the adequacy of emergency response plans and procedures in the sanctuary;

8. Maintains a record of emergency events (e.g., spills) in and around the sanctuary; and

9. Evaluates overall progress towards resource protection objectives of the sanctuary program; prepares a bimonthly report highlighting activities for the Marine and Estuarine Management Division.

California Department of Fish and Game

The following are responsibilities which the California Department of Fish and Game assumes as the agency enforcing state living marine resource regulations. These are not affected by sanctuary designation but are listed here because they are an important aspect of resource protection in the sanctuary:

1. Responsible for managing living marine resources and enforcement of state laws and regulations throughout state waters within the sanctuary;

2. Is deputized to enforce specific federal laws throughout the sanctuary (e.g., the Marine Mammal Protection Act, the Endangered Species Act, the Fisheries Conservation and Management Act).

The following are additional responsibilities directly related to resource protection in the sanctuary:

3. Prepares and submits to the Marine and Estuarine Management Division quarterly and annual summaries of California Department of Fish and Game enforcement data, including data on the types, nature, and location of surveillance and enforcement cases (relating to both California Department of Fish and Game and sanctuary regulations) in the sanctuary;

4. Is deputized by the Marine and Estuarine Management Division to enforce sanctuary regulations throughout the sanctuary.

Responsibilities assigned to the Sanctuary Warden are as follows:

1. Ensures that activities funded by the Marine and Estuarine Management Division in the sanctuary are consistent with California Department of Fish and Game regulations, policies, and procedures for managing living marine resources;

2. Facilitates California Department of Fish and Game/Marine and Estuarine Management Division information exchange and cooperation towards meeting resource protection goals and objectives for the sanctuary; and

3. Analyzes violations of regulations in the sanctuary based on the quarterly and annual summaries and recommends necessary changes in policy and procedures.

U.S. Coast Guard

The following is a responsibility which the U.S. Coast Guard assumes as a federal enforcement agency. It is not affected by sanctuary designation, but is listed here because it is an important aspect of resource protection in the sanctuary.

1. Holds a broad responsibility for enforcing all federal laws in navigable waters (i.e., throughout the sanctuary) and coordinates activities with the California Department of Fish and Game where state waters and resources are impacted by hazardous spills.

RESEARCH

Marine and Estuarine Management Division

1. Prepares a Sanctuary Research Plan outlining long-term research priorities, administrative guidelines, and administrative procedures for Marine and Estuarine Management Division funded projects.

2. Reviews and approves the list of annual research priorities, the annual research budget, and Requests for Proposals (RFP) for specific projects prepared by the Sanctuary Manager or by other agencies or persons to whom this task may be delegated;

3. Administers interagency agreements for research;

4. Reviews and approves all research proposals for Marine and Estuarine Management Division funded projects;

5. Reviews and approves interim and final research reports submitted by the Sanctuary Manager;

6. Evaluates overall progress towards achieving priorities for research and adjusts long-term directions accordingly;

7. Awards research permits as provided under sanctuary regulations; and

8. Coordinates research activities in the Channel Islands National Marine Sanctuary and the Gulf of the Farallones National Marine Sanctuary.

Sanctuary Manager and Staff

1. Administers Research Program as described in sanctuary management plan;

2. Coordinates with the Marine and Estuarine Management Division to set research budget priorities and coordinate research program development;

3. Reviews and reports on program annually and recommends changes to the Marine and Estuarine Management Division; and

4. Develops as necessary and provides project review of RFPs, proposals, contract amendments and all reports and products. Acts as Contracting Officer's Technical Representative on all contracts.

California Department of Fish and Game

The State Sanctuary Warden's responsibilities include:

1. Coordinates California Department of Fish and Game research projects undertaken within the sanctuary with research funded by the Marine and Estuarine Management Division;

2. Assists the Marine and Estuarine Management Division in reviewing research proposals, interim and final reports, where appropriate;

3. Reviews research permits as required by state laws and regulations; and

4. Provides assistance as appropriate.

INTERPRETATION AND EDUCATION

Marine and Estuarine Management Division

1. Reviews and approves plans for interpretation;

2. Reviews and approves the list of annual priorities for interpretation and the annual budget prepared by the Sanctuary Manager;

3. Reviews and approves final design proposals for all interpretive facilities and publications; and

4. Evaluates progress towards achieving priorities for interpretation and adjusts long-term priorities accordingly.

Sanctuary Manager and Staff

1. Oversees the implementation of the education program in the sanctuary with the assistance of the National Park Service;

2. Prepares and submits for approval an annual list of priorities for interpretation and an annual budget;

3. Prepares and circulates RFPs for interpretive projects as required;

4. Revises design proposals for interpretive materials and facilities for the sanctuary;

5. Supervises the design and production of interpretive materials and facilities for the sanctuary;

6. Coordinates marine interpretive programs for the sanctuary with related programs of the Channel Islands National Park, Golden Gate National Recreation Area and Point Reyes National Seashore;

7. Assists the National Park Service in training interpretive staff in sanctuary marine interpretation;

8. Assigns in consultation with the National Park Service, specific responsibilities and tasks to sanctuary interpretive staff; and

9. Encourages local and regional organizations to participate in sanctuary interpretation.

National Park Service (GGNRA)

1. Assists the Sanctuary Manager in developing an operational plan for marine interpretation in the sanctuary;

2. Reviews and approves with the Marine and Estuarine Management Division design proposals for interpretive materials and facilities for the sanctuary for use in the Golden Gate National Recreational Area (i.e., Cliff House, Marin Headlands);

3. Cooperates with the Sanctuary Manager in reviewing all other design proposals for materials and facilities as appropriate;

4. Cooperates with the Sanctuary Manager in supervising the design and production of materials and facilities for sanctuary interpretation; and

5. Is responsible for training National Park Service interpretive staff in interpretation of the sanctuary.

National Park Service (Point Reyes National Seashore)

1. Assists the Sanctuary Manager in developing an operational plan for marine interpretation in the sanctuary;

2. Cooperates with the Sanctuary Manager in reviewing all other design proposals for materials and facilities as appropriate;

3. Is responsible for training National Park Service interpretive staff in interpretation of the sanctuary.

GENERAL ADMINISTRATION

Marine and Estuarine Management Division

1. Develops, implements, and updates the management plan;

2. Provides funds for overall sanctuary management and administration;

3. Develops an annual budget for sanctuary management, setting out expenditures and operating costs for the various program areas jointly with the Sanctuary Manager;

4. Selects and monitors the performance of the Sanctuary Manager;

5. Determines additional staffing requirements; and

6. Provides for the necessary legal support for administering the sanctuary.

Sanctuary Manager and Staff

1. Reviews the management plan periodically and recommends changes to the Marine and Estuarine Management Division;

2. Assists the Marine and Estuarine Management Division in the development of an annual budget;

3. Prepares bi-monthly reports and semi-annual progress reports in cooperation with the National Park Service highlighting activities and events in all program areas (i.e., resource protection, research interpretation, and administration); and

4. Assigns responsibilities to sanctuary staff.

California Department of Fish and Game

1. Assists in the periodic review of the management plan and recommends changes to the Marine and Estuarine Management Division; and

2. Assists in determining funding requirements for surveillance and enforcement as part of the annual budget.

National Park Service

1. Assists in the periodic review of the management plan and recommends changes to the Marine and Estuarine Management Division;

2. Provides advice in determining funding requirements for resource protection, research, and interpretation as part of the annual budget; and

3. Provides support for general administration.

APPENDIX 6

RELEVANT LAWS AND REGULATIONS PERTAINING TO THE MANAGEMENT OF MARINE RESOURCES WITHIN THE GULF OF THE FARALLONES NATIONAL MARINE SANCTUARY (RESOURCES)

RESOURCE	ACT/REGULATION	AGENCIES
MARINE MAMMALS	Marine Mammals Protection Act (MMPA) (16 USC & 1361)	National Marine Fisheries Service (whales, porpoises, and pinnipeds)
		U.S. Fish and Wildlife Service (sea otter)
		Marine Mammal Commission
		California Department of Fish and Game (cooperative agreement)
	Endangered Species Act	U.S. Fish and Wildlife Service
		California Department of Fish and Game (cooperative agreement)
SEABIRDS	Federal Migratory Bird Treaty Act	U.S. Fish and Wildlife Service
	Endangered Species Act	U.S. Fish and Wildlife Service
		California Department of Fish and Game
	California Fish and Game Code	California Department of Fish and Game
FISH AND INVERTEBRATES	Magnuson Fishery Conservation and Management Act	Pacific Fishery Management Council
	Fishery Management Plans for anchovy, salmon, and rockfish	National Marine Fisheries Service
	California Fish and Game Code	California Department of Fish and Game
CULTURAL RESOURCES	National Historic Preservation Act	Department of the Interior
		California Historical Resources Commission
		California Public Resources Department

APPENDIX 7

RELEVANT LAWS AND REGULATIONS PERTAINING TO MARINE SPECIAL PROTECTED AREAS WITHIN THE GULF OF THE FARALLONES NATIONAL MARINE SANCTUARY

PROTECTED AREA	DESIGNATION	AGENCIES
DUXBURY REEF	Marine Reserve	California Department of Fish and Game
	Area of Special Biological Significance	California Regional Water Quality Control Board
TOMALES BAY	Ecological Reserve	California Department of Fish and Game
FARALLON ISLANDS (nearshore)	Area of Special Biological Significance	California Regional Water Quality Control Board
	Game Refuge	California Department of Fish and Game

NOTE: ASBS and Ecological Reserves adjacent but not within the sanctuary are not included here.

APPENDIX 8

RELEVANT LAWS AND REGULATIONS PERTAINING TO THE MANAGEMENT OF MARINE ACTIVITIES WITHIN THE GULF OF THE FARALLONES NATIONAL MARINE SANCTUARY

ACTIVITY	ACT/REGULATION	AGENCIES
OIL AND GAS DEVELOPMENT	Outer Continental Shelf Lands Act	Department of the Interior State Lands Commission
POLLUTANT DISCHARGES	Clean Water Act	Environmental Protection Agency
		Regional Water Quality Control Board (Section 402)
	Ports and Waterways Safety Act	U.S. Coast Guard
	National Contingency Plan	U.S. Coast Guard and EPA
	State Oil Spill Contingency Plan	California Department of Fish and Game
DREDGE AND FILL	Clean Water Act (Section 404) Rivers and Harbors Act (Section 10)	U.S. Corps of Engineers
FISHING	California Fish and Game Code	California Department of Fish and Game
	Magnuson Fishery Conservation and Management Act	Pacific Fishing Management Council
		National Marine Fisheries Service
		California Department of Fish and Game (cooperative agreement)
NAVIGATION	Ports and Waterways Safety Act	U.S. Coast Guard
COASTAL DEVELOPMENT	Coastal Zone Management Act (Section 307)	California Coastal Commission
	California Coastal Act	California Coastal Commission
	Marin County Local Coastal Program	Marin County
	Sonoma County Coastal Zoning Ordinance	Sonoma County

APPENDIX 9

DESIGNATION DOCUMENT — DESIGNATION OF THE POINT REYES/FARALLON ISLANDS MARINE SANCTUARY (NOW THE GULF OF THE FARALLONES NATIONAL MARINE SANCTUARY)

PREAMBLE

Under the authority of the Marine Protection, Research and Sanctuaries Act of 1972, P.L. 92-532 (the Act), the waters along the Coast of California north and south of Point Reyes Headlands, between Bodega Head and Rocky Point and surrounding the Farallon Islands, are hereby designated a Marine Sanctuary for the purposes of preserving and protecting this unique and fragile ecological community.

ARTICLE 1. Effect of Designation

Within the area designated as The Point Reyes/Farallon Islands Marine Sanctuary (the Sanctuary) described in Article 2, the Act authorizes the promulgation of such regulations as are reasonable and necessary to protect the values of the Sanctuary. Article 4 of the Designation lists those activities which may require regulation, but the listing of any activity does not by itself prohibit or restrict it. Restrictions or prohibitions may be accomplished only through regulation, and additional activities may be regulated only by amending Article 4.

ARTICLE 2. Description of the Area

The Sanctuary consists of an area of the waters adjacent to the Coast of California of approximately 948 square nautical miles (nmi), extending seaward to a distance of 6 nmi from the mainland and 12 nmi from the Farallon Islands and Noonday Rock, and including the intervening waters. The precise boundaries are defined by regulation.

ARTICLE 3. Characteristics of the Area that Give it Particular Value

The Sanctuary includes a rich and diverse marine ecosystem and a wide variety of marine habitat, including habitat for 20 species of marine mammals. Rookeries for over half of California's nesting marine bird and nesting areas for at least 12 of 16 known U.S. nesting marine bird species are found within the boundaries. Abundant fish and shellfish are harvested in the Sanctuary.

ARTICLE 4. Scope of Regulation

Section 1. Activities Subject to Regulation

In order to protect the distinctive values of the Sanctuary, the following activities may be regulated within the Sanctuary to the extent necessary to ensure the protection and preservation of its marine features and the ecological, recreational, and aesthetic value of the area:

(A) Hydrocarbon operations.

(B) Discharging or depositing any substance.

(C) Dredging or alteration of, or construction on, the seabed.

(D) Navigation of vessels except fishing vessels or vessels travelling within a vessel traffic separation scheme or port access route designated by the Coast Guard outside the area 2 nmi from the Farallon Islands, Bolinas Lagoon or any Area of Special Biological Significance, other than that surrounding the Farallon Islands, established by the State of California prior to designation.

(E) Disturbing marine mammals and birds by overflights below 1000 feet.

(F) Removing or otherwise harming cultural historical resources.

Section 2. Consistency with International Law

The regulations governing the activities listed in Section 1 of this Article will apply to foreign flag vessels and persons not citizens of the United States only to the extent consistent with recognized principles of international law, including treaties and international agreements to which the United States is signatory.

Section 3. Emergency Regulations

Where essential to prevent immediate, serious, and irreversible damage to the ecosystem of the area, activities other than those listed in Section 1 may be regulated within the limits of the Act on an emergency basis for an interim period not to exceed 120 days, during which an appropriate amendment of this Article will be proposed in accordance with the procedures specified in Article 6.

ARTICLE 5. Relation to Other Regulatory Programs

Section 1. Fishing and Waterfowl Hunting

The regulation of fishing, including fishing for shellfish and invertebrates, and waterfowl hunting, is not authorized under Article 4. However, fishing vessels may be regulated with respect to discharges in accordance with Article 4, paragraph (b) and mariculture activities involving alteration or construction of the seabed can be regulated in accordance with Article 4 paragraph (c). All regulatory programs pertaining to fishing, and to waterfowl hunting, including regulations promulgated under the California Fish and Game Code and Fishery Management Plans promulgated under the Fishery Conservation and Management Act of 1976, 16 U.S.C. § 1801 et seq., will remain in effect, and all permits, licenses, and other authorizations issued pursuant thereto will be valid within the Sanctuary unless authorizing any activity prohibited by any regulation implementing Article 4. Fishing as used in this article and in Article 4 includes mariculture.

Section 2. Defense Activities

The regulation of activities listed in Article 4 shall not prohibit any Department of Defense activity that is essential for national defense or because of emergency. Such activities shall be consistent with the regulations to the maximum extent practicable.

Section 3. Other Programs

All applicable regulatory programs will remain in effect, and all permits, licenses, and other authorizations issued pursuant thereto will be valid within the Sanctuary unless authorizing any activity prohibited by any regulation implementing Article 4. The Sanctuary regulations will set forth any necessary certification procedures.

ARTICLE 6. Alterations to this Designation

This Designation may be altered only in accordance with the same procedures by which it has been made, including public hearings, consultation with interested Federal and State agencies and the Pacific Regional Fishery Management Council, and approval by the President of the United States.

Accordingly, Part 936 is proposed as follows:

PART 936 - THE POINT REYES/ FARALLON ISLANDS MARINE SANCTUARY REGULATIONS

936.1 Authority
936.2 Purpose
936.3 Boundaries
936.4 Definitions
936.5 Allowed Activities
936.6 Prohibited Activities
936.7 Penalties for Commission of Prohibited Acts
936.8 Permit Procedures and Criteria
936.9 Certification of Other Permits
937.10 Appeals of Administrative Action

§ 936.1 AUTHORITY

The Sanctuary has been designated by the Secretary of Commerce pursuant to the authority of Section 302(a) of Title III of the Marine Protection, Research and Sanctuaries Act of 1972, 16 U.S.C. 1431-1434 (the Act). The following regulations are issued pursuant to the authorities of Sections 302(f), 302(g), and 303 of the Act.

§ 936.2 PURPOSE

The purpose of designating the Sanctuary is to protect and preserve the extraordinary ecosystem, including marine birds, mammals, and other natural resources, of the waters surrounding the Farallon Islands and Point Reyes, and to ensure the continued availability of the area as a research and recreational resource.

§ 936.3 BOUNDARIES

The Sanctuary consists of an area of the waters adjacent to the coast of California north and south of the Point Reyes Headlands, between Bodega Head and Rocky Point and the Farallon Islands (including Noonday Rock), and includes approximately 948 square nautical miles (nmi^2). The coordinates are listed in Appendix 1.

The shoreward boundary follows the mean high tide line and the seaward limit of Point Reyes National Seashore. Between Bodega Head and Point Reyes Headlands, the Sanctuary extends seaward 3 nmi beyond State waters. The Sanctuary also includes the waters within 12 nmi of the Farallon Islands, and between the Islands and the mainland from Point Reyes Headlands to Rocky Point. The Sanctuary includes Bodega Bay, but not Bodega Harbor.

§ 936.4 DEFINITIONS

(A) "Administrator" means to the Administrator of the National Oceanic and Atmospheric Administration.

(B) "Areas of Special Biological Significance" (ASBS) means to those areas established by the State of California prior to the designation of the sanctuary except that for purposes of these regulations, the area established around the Farallon Islands shall not be included.

(C) "Assistant Administrator" means to the Assistant Administrator for Coastal Zone Management, National Oceanic and Atmospheric Administration.

(D) "Person" means any private individual, partnership, corporation, or other entity; or any officer, employee, agent, department, agency, or instrumentality of the Federal Government or any State or local unit of government.

(E) "Vessel" means watercraft of any description capable of being used as a means of transportation on the waters of the Sanctuary.

§ 936.5 ALLOWED ACTIVITIES

All activities except those specifically prohibited by § 936.6 may be carried on in the Sanctuary subject to all prohibitions, restrictions, and conditions imposed by any other authority. Recreational use of the area is encouraged.

§ 936.6 PROHIBITED ACTIVITIES

(A) Except as may be necessary for national defense, in accordance with Article 5, § 2 of the Designation, or as may be necessary to respond to an emergency threatening life, property or the environment, the following activities are prohibited within the Sanctuary unless permitted by the Assistant Administrator in accordance with Sections 936.8 or 936.9. All prohibitions shall be applied consistently with international law.

(1) Hydrocarbon operations.
Hydrocarbon exploration, development, and production are prohibited except that pipelines related to operations outside the Sanctuary may be placed at a distance greater than 2 nmi from the Farallon Islands, Bolinas Lagoon, and Areas of Special Biological Significance where certified to have no significant effect on sanctuary resources in accordance with § 936.9.

(2) Discharge of substances.
No person shall deposit or discharge any materials or substances of any kind except:

(A) Fish or parts and chumming materials (bait).

(B) Water (including cooling water) and other biodegradable effluents incidental to vessel use of the sanctuary generated by:

(i) marine sanitation devices;

(ii) routine vessel maintenance, e.g., deck wash down;
(iii) engine exhaust; or
(iv) meals on board vessels.

(C) Dredge material disposed of at the interim dumpsite now established approximately 10 nmi south of the southeast Farallon Island and municipal sewage provided such discharges are certified in accordance with Section 936.9.

(3) Alteration of or construction on the seabed.

Except in connection with the laying of pipelines or construction of an outfall if certified in accordance with Section 936.9, no person shall:

(A) Construct any structure other than a navigation aid,

(B) Drill through the seabed, and

(C) Dredge or otherwise alter the seabed in any way other than by anchoring vessels or bottom trawling from a commercial fishing vessel, except for routine maintenance and navigation, ecological maintenance, mariculture, and the construction of docks and piers in Tomales Bay.

(4) Operations of vessels.

Except to transport persons or supplies to or from islands or mainland areas adjacent to sanctuary waters, within an area extending 2 nautical miles from the Farallon Islands, Bolinas Lagoon, or any Area of Special Biological Significance, no person shall operate any vessel engaged in the trade of carrying cargo, including but not limited to tankers and other bulk carriers and barges, or any vessel engaged in the trade of servicing offshore installations. In no event shall this section be construed to limit access for fishing, recreational or research vessels.

(5) Disturbing marine mammals and birds.

No person shall disturb seabirds or marine mammals by flying motorized aircraft at less than 1,000 feet over the waters within one nautical mile of the Farallon Islands, Bolinas Lagoon, or any Area of Special Biological Significance except to transport persons or supplies to or from the Islands or for enforcement purposes.

(6) Removing or damaging historical or cultural resources.

No person shall remove or damage any historical or cultural resource.

(A) All activities currently carried out by the Department of Defense within the Sanctuary are essential for the national defense and, therefore, not subject to these prohibitions. The exemption of additional activities having significant impacts shall be determined in consultation between the Assistant Administrator and the Department of Defense.

(B) The prohibitions in this section are not based on any claim of territoriality and will be applied to foreign persons and vessels only in accordance with recognized principles of international law, including treaties, conventions, and other international agreements to which the United States is signatory.

§ 936.7 PENALTIES FOR COMMISSION OF PROHIBITED ACTS.

(A) Section 303 of the Act authorizes the assessment of a civil penalty of not more than $50,000 against any person subject to the jurisdiction of the United States for each violation of any regulation issued pursuant to the Act, and further authorizes a proceeding in rem against any vessel used in violation of any such regulation. Procedures are outlined in Subpart D of Part 922 (15 CFR Part 922) of this chapter. Subpart D is applicable to any instance of a violation of these regulations.

§ 936.8 PERMIT PROCEDURES AND CRITERIA.

(A) Any person in possession of a valid permit issued by the Assistant Administrator in accordance with this section may conduct any activity in the Sanctuary, prohibited under Section 936.6, if such an activity is (1) research related to the resources of the Sanctuary, (2) to further the educational value of the Sanctuary, or (3) for salvage or recovery operations.

(B) Permit applications shall be addressed to the Assistant Administrator for Ocean Services and Coastal Zone Management, Attn: Office of Coastal Zone Management, MEMD, National Oceanic and Atmospheric Administration, 1826 Connecticut Avenue, N.W., Washington, D.C. 20235. An application shall provide sufficient information to enable the Assistant Administrator to make the determination called for in paragraph (C) following and shall include a description of all activities proposed, the equipment, methods, and personnel (particularly describing relevant experience) involved, and a timetable for completion of the proposed activity. Copies of all other required licenses or permits shall be attached.

(C) In considering whether to grant a permit, the Assistant Administrator shall evaluate (1) the general professional and financial responsibility of the applicant, (2) the appropriateness of the methods envisioned to the purpose(s) of the activity, (3) the extent to which the conduct of any permitted activity may diminish or enhance the value of the Sanctuary, (4) the end value of the activity, and (5) other matters as deemed appropriate.

(D) In considering any application submitted pursuant to this section, the Assistant Administrator may seek and consider the views of any person or entity, within or outside the Federal Government, and may hold a public hearing, as deemed appropriate.

(E) The Assistant Administrator may, at his or her discretion, grant a permit which has been applied for pursuant to this section, in whole or in part, and subject to such condition(s) as deemed appropriate. The Assistant Administrator or a designated representative may observe any permitted activity and/or require the submission of one or more reports of the status or progress of such activity. Any information obtained will be made available to the public.

(F) The Assistant Administrator may amend, suspend or revoke a permit granted pursuant to this section, in whole

or in part, temporarily or indefinitely if the permit holder (the Holder) has violated the terms of the permit or applicable regulations. Any such action will be provided in writing to the Holder, and will include the reason(s) for the action taken. The Holder may appeal the action as provided for in § 936.10.

§ 936.9 CERTIFICATION OF OTHER PERMITS.

(A) All permits, licenses, and other authorizations issued pursuant to any other authority are hereby certified and shall remain valid if they do not authorize any activity prohibited by § 936.6. Any interested person may request that the Assistant Administrator offer an opinion on whether an activity is prohibited by these regulations.

(B) A permit, license, or other authorization allowing the discharge of municipal sewage, the laying of any pipeline outside 2 nmi from the Farallon Islands, Bolinas Lagoon and Areas of Special Biological Significance, or the disposal of dredge material at the interim dumpsite now established approximately 10 nmi south of the Southeast Farallon Island prior to the selection of a permanent dumpsite shall be valid if certified by the Assistant Administrator as consistent with the purpose of the Sanctuary and having no significant effect on sanctuary resources. Such certification may impose terms and conditions as deemed appropriate to ensure consistency.

(C) In considering whether to make the certifications called for in this section, the Assistant Administrator may seek and consider the views of any other person or entity, within or outside the Federal Government, and may hold a public hearing as deemed appropriate.

(D) Any certification called for in this section shall be presumed unless the Assistant Administrator acts to deny or condition certification within 60 days from the date that the Assistant Administrator receives notice of the proposed permit and the necessary supporting data.

(E) The Assistant Administrator may amend, suspend, or revoke any certification made under this section whenever continued operation would violate any terms or conditions of the certification. Any such action shall be forwarded in writing to both the holder of the certified permit and the issuing agency and shall set forth reason(s) for the action taken.

(F) Either the holder or the issuing agency may appeal any action conditioning, denying, amending, suspending, or revoking any certification in accordance with the procedure provided for in § 936.10.

§ 936.10 APPEALS OF ADMINISTRATIVE ACTION

(A) Any interested person (the Appellant) may appeal the granting, denial or conditioning of any permit under § 936.8 to the Administrator of NOAA. In order to be considered by the Administrator, such appeal must be in writing, must state the action(s) appealed, and the reason(s) therefore, and must be submitted within 30 days of the action(s) by the Assistant Administrator. The Appellant may request an informal hearing on the appeal.

(B) Upon receipt of an appeal authorized by this section, the Administrator will notify the permit applicant, if other than the Appellant, and may request such additional information and in such form as will allow action upon the appeal. Upon receipt of sufficient information, the Administrator will decide the appeal in accordance with the criteria defined in § 936.8(C) as appropriate, based upon information relative to the application on file at OCZM and any additional information, the summary record kept of any hearing, and the Hearing Officer's recommended decision, if any, as provided in paragraph (C) and such other considerations as deemed appropriate. The Administrator will notify all interested persons of the decision, and the reason(s) for the decision, in writing, within 30 days of receipt of sufficient information, unless additional time is needed for a hearing.

(C) If a hearing is requested or if the Administrator determines one is appropriate, the Administrator may grant an informal hearing before a designated Hearing Officer after first giving notice of the time, place, and subject matter of the hearing in the Federal Register. Such hearing must normally be held no later than 30 days following publication of the notice in the Federal Register unless the Hearing Officer extends the time for reasons deemed equitable. The Appellant, the Applicant (if different), and other interested persons (at the discretion of the Hearing Officer) may appear personally or by counsel at the hearing, and submit material and present arguments as determined appropriate by the Hearing Officer. Within 30 days of the last day of the hearing, the Hearing Officer shall recommend in writing a decision to the Administrator.

(D) The Administrator may adopt the Hearing Officer's recommended decision, in whole or in part, or may reject or modify it. In any event, the Administrator shall notify interested persons of the decision, and the reason(s) for the decision, in writing, within 30 days of receipt of the recommended decision of the Hearing Officer. The Administrator's action will constitute final action for the agency for the purposes of the Administrative Procedures Act.

(E) Any time limit prescribed in this section may be extended for a period not to exceed 30 days by the Administrator for good cause upon written request from the Appellant or Applicant stating the reason(s) for the extension.

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